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BRIEFLY TOLD.

OBITUARY NOTE, MR. HENRY EUGENE PRINTZ.—With great regret we are obliged to report the death of Mr. Henry Eugene Printz, who passed away at his home in Zanesville, O., the morning of Saturday, March 2d, after an illness that covered a long period. He had for years been a sufferer from heart disease, but the end came peacefully and painlessly; in fact, as one informant put it, "He literally slept his life away." Deceased, who was the son of Andrew J. Printz, was born in Zanesville, March 26th, 1843, and acquired his education in the public schools of that city, graduating therefrom in 1860. He learned the machinist's trade forthwith, serving with the local firm known as the Griffith & Wedge Company, remaining with it until 1865, when he succeeded his father, the late Andrew Jackson Printz, as Superintendent of the Zanesville Gas Light and Coke Company. His father settled in Zanesville in 1819, and was one of the best known men of his day and time in Muskingum county, his death occurring in 1865. The connection of deceased with the Zanesville Company—for several years he was its Secretary as well as its Superintendent—was for over 40 years, and under his direction it prospered exceedingly. Perhaps no other man attained greater prominence in Zanesville than the subject of this memoir, as this brief naming of the many business and other relations he sustained towards it will attest. He was President of the *Times-Recorder* Company, Vice-President of the Security Trust and Savings Company, Vice-President of the State Savings Bank, President of the Economy Building and Loan Company, President of the Odd Fellows Hall Association and a Director in the Gorsuch Glass Company. Nor did he merely figure in such official capacities; on the contrary he took active part in their development and management. He was active in almost every phase of the religious, civic, business and social life of Zanesville, having served it many times as Councilman and as a member of its Board of Education—he was chosen President of the latter body in 1903. He was prominent in the Western and the Ohio Gas Associations, being a charter member of the latter, and served it as its Third President. He was prominent in the ranks of the Odd Fellows' Society, and it was under their loving care that he was committed to the grave, the afternoon of the 5th inst. He is survived by his mother—who lives in the glorious calm of a span that covers 83 years, in the possession of every faculty—and his wife, to whom he was united in marriage, December, 1866. Of this union 6 children survive, a son (Charles H. Printz, who holds a prominent position with the Western Gas Construction Company) and 5 daughters. Of his personality perhaps the following lines, written by one who knew him well, will be most to the point: "He had ever discharged his duties with marked ability, honesty and fairness, for he was a most loyal, public spirited citizen. As a business man he has been conspicuous among his associates, not only for his success, but for his probity, fairness and honorable methods. In everything he had been eminently practical, and this had been manifest not only in his business undertakings, but also in social and private life."

CURRENT COMMENT.—

WE are indebted to the Gas Engine Publishing Company, of Cincinnati, O., for a copy of its well put together volume, just out of press,

which bears the title "Questions and Answers from the Gas Engine." It should be in the library of every maker, seller and user of gas engines.

MR. EDWARD WARREN, formerly Superintendent of the works at Hamburg, Pa., has been appointed Superintendent of the plant of the Consumers Gas Company, at Atlantic City, N. J. Fortunate it is for him that he is such a hard worker, for he will find plenty to do in his new field—the plant is partly equipped with *petite* Logan-Janeway sets!

THE dates for the next meeting of the Texas Electric and Gas Association have been set for May 14-16, and San Antonio will be the meeting place. So the circular sent out by the Secretary (Mr. R. B. Stichter, of Dallas) states.

THE last meeting of the New York Section of the Illuminating Engineering Society was held in the Edison Auditorium, 44 West 27th street, the evening of the 8th inst. The attendance was excellent and the proceedings were of great interest. The paper list carried numbers by the following contributors: Wm. T. Clarke, President, National Commercial Gas Association; S. B. Burrows, Edison Illuminating Company, Brooklyn, N. Y.; E. A. Norman, the New York Edison Company; Chas. Cohn, Consolidated Gas and Electric Company, Baltimore, Md.

THE Directors of the Louisville (Ky.) Lighting Company, which incorporation is under the direction of the Louisville Gas Company, have arranged for the placing of the service wires in conduits. As we understand it, the work will be done by the Abadie Company, of St. Louis.

IT is reported that negotiations are in forward state looking to the purchase of the Windsor (Ont.) Gas Company by Chicago capitalists.

THE Harrisburg (Pa.) Gas Company is now comfortably placed in its beautifully arranged and equipped office quarters on South Market Square.

"L. B. M.," writing from Indianapolis, Ind., under date of the 1st inst., incloses the following: "In a suit brought in Seymour, Ind., before the Circuit Court by the Western Gas and Investment Company, of Chicago, against the Seymour Gas and Electric Light Company, a judgment for $21,639 was rendered against the defendant Company. The suit was on a note and defendant confessed judgment. An execution was ordered and the Sheriff has levied on the gas and electric light plants, which have been advertised to be sold by the Sheriff on the 23d inst. Mr. John H. Brown, of Chicago, is the President of the Seymour Gas and Electric Light Company, and as such officer he was present in court and confessed judgment. It developed that he is also President of the Western Gas and Investment Company that brought the suit. He, therefore, represented both sides of the case and appeared in the attitude of a man bringing suit against himself."

A SUIT has been filed in the Court of Common Pleas against the old Wooster (O.) Gas Light Company, for the purpose of segregating the accounts and assets of the old Company. The complainants allege there is a large number of accounts, with other assets as well, and accordingly have petitioned for a Receiver.

AT the annual meeting of the Saginaw City (Mich.) Gas Company the officers chosen were: Directors, George B. Morley, James B. Peter, T. E. Dorr, B. C. Cobb, S. E. Wolff, T. A. Harvey, H. D. Walbridge and E. H. Potter; President, H. D. Walbridge; Vice-President, George B. Morley; Secy.-Treas., Chas. E. Mershon; Asst. Secy.-Treas., G. E. Hardy.

THE Carbondale (Pa.) Gas Company has under contemplation an extension of its main system to the outlying district of Simpson.

THE last traces of the old Trenton (N. J.) Gas Light Company's plant have been removed. The original holder (constructed in 1847 by the Camden Iron Works), rated to hold 30,000 cubic feet, was torn down a fortnight ago. The guide-framing thereof was still in good condition.

THE residents of Towson, a suburb of Baltimore, Md., are anxious that the Consolidated Gas, Electric Light and Power Company should extend its mains to and through that section.

THE new executive management of the Northwestern Gas and Electric Company, of Walla Walla, Wash., is as follows: President, Isaac W. Anderson: Vice-President, Cary M. Rader; Secretary, Robert E. Allen.

PROF. CHARLES F. CROWLEY has been appointed Gas Commissioner for Omaha, Neb., under the recent ordinance creating that position. It is an excellent appointment.

The Present and Growing Need for the General Adoption of a Uniform System of Records and Accounts.

[A paper read by DR. ALEXANDER C. HUMPHREYS, President Stevens Institute of Technology, Hoboken, N. J., at the last meeting of the New England Association of Gas Engineers, February 20, 1907.]

Some weeks ago I was urged by your President to prepare a paper for this meeting. Overburdened as I was at the time, my first inclination was to decline positively. I was moved to hold my decision in abeyance by three reasons; I thought it was possible that, before the time came for the meeting, I might get relief from part of my burdens; circumstances had recently occurred to impress me again and particularly with the importance of the subject which I am now considering; and I was anxious, if possible, to comply with the request of your President so graciously presented.

Having obtained some little relief from the duties weighing upon me, I have been influenced by the two other considerations to present to you this discussion of a subject which I believe to be, at the present moment, of vital importance to the gas industry of America; and here let us realize that what concerns the real prosperity of any important industry of necessity must concern the people at large. In what is to follow I shall endeavor to present to the gas men of New England and through them to the gas men of the United States, a warning and an appeal.

Speaking as frankly as I propose to do, I shall not be surprised if I subject myself to severe criticisms. While I am not more patient under criticism than other men, if any good comes from this effort, I shall willingly submit to such criticism. Further, I shall not allow any false modesty to prevent me from taking the position that I am qualified to speak in connection with the gas business with some degree of authority as an engineer, an operator and an engineer accountant. On my part I shall endeavor to avoid unfair criticism of those from whom I radically disagree. I shall not apologize for referring to certain facts and figures still before the courts, for these have already been reported in the daily press, although almost always in a way calculated to mislead.

Plain speaking in regard to our public utilities has been the vogue for some time past. But this plain speaking has been somewhat one-sided. Some of our daily papers and some of our magazines have helped to develop the vogue, and some others have been prompt to follow the lead thus set. I believe that, in the opinion of many well informed, thoughtful, men the time has come when a monopoly of plain speaking must not be left to those whose utterances too often are born of misinformation and indiscretion. This monopoly of plain speaking should not be left to those upon one side, even though the President of the United States be one of those endeavoring to maintain the monopoly. Let me not be misunderstood. In my opinion, President Roosevelt has unquestionably done much good by his plain speaking and courageous actions; but I also as firmly believe that he has done harm and will do much harm before his term expires, unless he tempers his strenuousness with more discretion.

A storm of reform has for some time been raging over these United States. There has been need of reform and, therefore, all the more need of the exercise of discretion in the application of remedial measures. There has been much amateur lawmaking; many have been engaged in the task of trying to reform others who might well have been engaged in the effort to form or reform themselves. We have been busy with investigations. I am reminded of the story of the man trying to find a high officer in a railroad company to discuss a matter of importance.

The story goes that the highest officer he could find was a train dispatcher. When asked for an explanation, he stated that all his superior officers were engaged in investigations in Washington and in the several States through which the railroad passed. To my personal knowledge this is not much of an exaggeration, for, in an investigation and lawsuits following in New York city to which I shall have occasion to refer, the officers of the company have been obliged to leave the conduct of the business to subordinates, while they were endeavoring to meet the demands—often unreasonable—of the investigators. If all of the ante-election pledges of politicians are kept, many of our public service corporations will be investigated out of existence or into a condition of premature decay.

In studying the details of some of these investigations I have often paused to consider the question: What would be the result if the investigators were investigated? Such a thought in many cases must naturally come to those who consider the personnel of legislative investigating committees.

Let us have reform! We cannot have too much of it, provided it is good in quality: but the spurious article is no better and perhaps worse than the original evil, because it is based upon ignorance and hypocrisy.

We hear much of the "new idea" in politics, and we are told that the country must look to the young men for its salvation. By all means let our young men concern themselves in public affairs, and may they be strengthened to purify and enlarge our municipal, State, and national life! But let them take up their task with a becoming sense of modesty and with a due appreciation of the fact that real knowledge must precede efficient effort in this or any other line. And let them especially understand that the knowledge of the schoolman does not afford a complete equipment for public service, but rather to the contrary, unless, in addition to the course of instruction in college and to the experience as an instructor in college, there is added the training in the school of experience. I am afraid that it is no exaggeration when I say that the "professor" is a distinct danger in connection with reform movements if he is only a schoolman. Too often this kind of schoolman, on account of his position, is permitted to speak with an assumption of authority in subjects on which his ignorance is profound. Let our young men understand that education is a tremendous instrumentality for good, but that there is needed, for the work they propose to undertake, personal character and common sense to make their education effective for good. Let them further understand that school education is not a cure-all, as too many in the United States to day seem to believe.

Some good has resulted from some of the investigations so far held. Undoubtedly evils have been corrected. And for this let us all be duly thankful and give credit where credit is due; but because good has so resulted, that is no reason we should as a nation acquire the investigating habit and, in that connection, feel that we have not done our duty unless all industrial enterprises have been tried before the bar of public opinion.

A few days since I was shocked to be told by a friend of a conversation he had just had with a prominent judge. Speaking of an investigation of the character to which I have referred and which had been carried into the courts, the judge asked my friend his opinion as to the outcome. My friend, being well informed as to the character of the evidence on both sides, expressed the opinion that the outcome must of necessity be favorable to the corporation under fire. The judge then expressed the opinion that the courts, in spite of the evidence, would not dare to decide in favor of the companies because public opinion would thus be outraged. And this, bear in mind, was the opinion expressed by a judge generally held in respect. Can it be that we in the United States, calling ourselves a free people, claiming that we are protected in our rights both as to person and property, have arrived at the pass where our judges are ready to acknowledge that in their decisions they must be governed by public clamor? If so, it behooves us all to call a halt in the present mad tendency towards indiscriminate condemnation of matters imperfectly understood by the majority. In criminal law a man is accounted innocent until he is convicted through due process of law. Shall we accord a smaller measure of protection to our corporate interests?

How do these questions affect us, who are directly interested in the gas business? Have we done our full duty in the effort to protect the interests entrusted to us? I fear that the answer must be in the negative. We have not always been sufficiently alert and conscientious in preventing and eliminating acts on the part of our subordinates which tend to provoke unfriendly criticism. We should always be watchful for the maintenance of the rights of our customers. On the other hand, we have not always been sufficiently courageous and determined in maintaining our own rights. In my opinion the time has now come when we must, one and all, recognize that the only safe course for corporations engaged in serving the public is one which gives the public all that it has a right to expect, including courteous treatment, and then is equally insistent that the public and its servants shall recognize the rights of the corporations which we serve. The day has passed when secrecy as to our accounts can be depended upon for our protection from misapprension and misrepresentation. Secrecy necessarily leads to suspicion on the part of those not in the secret. To this proposition we must submit in spite of the fear of legislative "strikes."

Here in Massachusetts you have for years been subject to a measure of control through a Commission, and to this Commission you have been obliged to make returns covering the operations of your business. There has been, and still exists, great difference of opinion as to the protection accompanying this system of control. Undoubtedly, the system has afforded a measure of protection; but the protection has been by no means complete. Conditions in this regard in Massachusetts have undoubtedly been improved through the years since the Commission was first appointed; but there is still room for improvement. The gas men of Massachusetts are to be congratulated that their Commission is presided over by a man who has been long enough in the Board to learn and who has been ready to learn. And in speaking of the conditions brought about by the appointment of a Gas and Electric Commission in New York, we no doubt should bear in mind that there has as yet been but little time for this improving growth and development. But what value is there in studying records of facts accomplished unless we intend by that study to avoid as far as possible unnecessary error? In New York we were told that the appointment of a Commission would relieve us from legislative attack; that when we were obliged to submit to control it would only be as the result of careful and expert examination. But this has not been the result in New York State. Not only has the Commission apparently conceived it to be its duty to investigate as many companies as possible within a given time, but the Legislature has stepped in, *even while investigations were being held by the Commission, and passed laws reducing the price of gas.* So, instead of exchanging masters, we are now subject to two.

I confess that when the question of the appointment of a Gas Commission was first broached in New York State I was inclined to favor it. Having been already concerned in four investigations instituted by this Commission, I congratulate myself that I have not to carry any of the responsibility in connection with its appointment. My opinion is that this change remains to be justified.

It is evident that such a Board, if it is to be in a position to act fairly between the corporations and the public, must be free from political control. Is this not a condition most difficult to comply with in these United States even on the part of those who desire to be fair?

It certainly should also go without saying that such a Board should be ready and empowered to protect the corporations from hasty, ill-considered legislative action. Let it be at once understood that I am not making any personal reflections in this connection. I am simply endeavoring to face a situation which I know to exist. In justice to those concerned, we may well bear in mind also that this New York Board came into existence at a time most inopportune for the development of fair play. The public, egged on by the yellow press, was clamoring for victims. The chances are that men absolutely refusing to be influenced by anything but the facts developed through the investigations and so deaf to political arguments, would not have been able to hold office; and then the last condition might well have been worse than the first.

Unquestionably such a Board should not be composed alone of lawyers, as is the New York Board. In this country we far too much depend upon the services and submit to the dictation of lawyers. There are lawyers and lawyers, the same as there are engineers and engineers, or physicians and physicians. I find it quite as difficult to select a competent lawyer for an adviser as I do a competent engineer as an assistant. As a general proposition, I am firmly of the opinion that a competent engineer is as capable of advising on a question of law as a competent lawyer is capable of advising on a question of engineering. And it is to be remembered that here in the United States there are many more lawyers than there is room for in the field of practice.

Such a Board as I am referring to should, I believe, be made up of an engineer, a business man and a lawyer. But even then these men, if they are not, in the first instance, experienced in the line of business which they are commissioned to govern, should first bend themselves conscientiously to the task of learning that business, the same as the rest of us have had to do.

No man should be appointed or allowed to remain on such a Board who is biased for or against corporations. Certainly no man holding socialistic views should be permitted to serve on such a Board. And here we should not forget that we have something to say in this country as to who shall be our servants and judges.

In justice to the New York Board, we must also remember that they were ignorant of the gas business; they were at once called upon to take up complicated investigations; and were given no time in which first to learn the business they had been empowered to direct and control. Furthermore, the yellow journal public opinion demanded that results should be forthcoming at once. The business, intricate in its nature, which has taken some of us a lifetime to learn, these men were expected to understand without study the morning after their appointment. For this expectation they were not responsible.

The appointment of this New York Board was preceded by the investigation of the New York City Companies by a committee of the New York Legislature. This Committee is known as the Stevens Com-

mittee, by reason of the name of its Chairman. The present Governor of the State of New York served as its counsel, and through his efforts on that Committee first gained public attention; through the record made in that Committee he was called to direct the investigations of the insurance companies in which he displayed marked ability as a cross-examiner; and so finally he was called to the Governorship of New York State.

This investigation by the Stevens Committee has been repeatedly spoken of and repeatedly referred to as a thorough investigation. It has been so referred to in the opinions of certain of the judges in connection with cases developed by the 80 cent law. An idea of the "thoroughness" of this investigation can be had by considering that in 4 weeks the attempt was made to investigate about 20 companies. One of the members of the Committee afterwards served as counsel for the State in the investigation of a single 1 of the 20 companies, namely, the Consolidated Gas Company, of New York, before the New York Commission, and later in the action brought by the Consolidated Company against the City and State of New York. After having been concerned in these two cases for about a year, this gentleman, who had been most prominent in claiming that the Stevens investigation had been "thorough," requested from the Court an extension of time because this case of 1 Company of the 20 was so complicated that not sufficient time had been allowed for a thorough mastery of the matters involved.

We could afford to smile at this claim of thoroughness were it not that laws born of ignorance and fathered by misinformation were passed as a result of this Stevens investigation, and the evil results therefrom have already begun to spread to other States.

Let me give you an example. You are probably all aware that, as a result of this investigation, a law was passed which limited the pressure under which gas should be distributed in New York city between a minimum of 1 inch and a maximum of 2½ inches, the law stating that this pressure should be the pressure in the "service mains." In an affidavit which I made in connection with this law I ventured to state my understanding of the term "service mains." It is evident that the Committee were unconscious of the fact that in "service mains" they had coined a new technical term, for Mr. Hughes, who is a thoroughly fair man, while presenting an argument before Judge Lacombe in referring to an affidavit by me, intimated that I was quibbling by pretending that it was necessary to first define the term "service main" before attempting to express my views on the pressure law. In talking this matter over later with the gentlemen on the other side, all I could arrive at was that they had mixed up the term "service" and "mains." It now seems that the majority of those responsible for the law hold that what they intended to cover by this hybrid term was distributing mains as differentiated from "transfer," "high pressure" or "booster" mains. In other words, those who had any clear idea on the subject probably intended to make the law apply to the pressure of gas in the mains to which the service pipes are attached, though there still appears to be some disagreement among themselves as to what was intended.

The Chairman of this Committee, Mr. Stevens, had been and possibly still is interested in the gas business at Washington, and apparently certified to the Committee that of his knowledge such a limitation as the one referred to, namely, between 1 inch and 2½ inches, was a reasonable one, as in Washington the maximum pressure was considerably less than 2½ inches.

On page 2,316 of the record of this Stevens investigation we find Chairman Stevens asking a witness if the *average* Washington pressure was not 62 and the *highest* 176; meaning, no doubt, .62 inch and 1.76 inches respectively.

In the Consolidated Company investigation before the Commission I had questions of this same nature put to me by the Commissioners, and I was also asked a number of times whether I did not know that there was a pressure law in Washington similar to the one intended to govern in the city of New York. Evidently the Committee and the Commission were of the opinion that there *was* such a pressure law in force in Washington and that the gas *was* distributed in Washington within the limits of 1 inch and 2½ inches. What are the facts, and were the facts open to the Stevens Committee before the pressure law was passed through its influence? They were: The 1,904 Report of the Washington Inspector of Gas and Meters shows pressures at three testing stations in Washington proper, running from 62 *minimum* to 2.90 *maximum*, and at one of these stations the minimum was .62 and the *average* was 1.71. These last two figures, valueless by themselves, seem in part to have formed the basis of Chairman Stevens' impression of *average* .62 and *maximum* 1.76. The variation at the single Georgetown testing station was between a minimum of .38 and a maximum of 5.30. Although these later reports were not open to the Stevens Committee, it is of interest to note that the Report of 1905 shows a variation at the 3 Washington testing stations between 1.10 minimum and 3.10 maximum; and a variation at the Georgetown station between 1 minimum and 4.24 maximum. The 1906 Report shows, for the 3 testing stations, a variation between 1.16 minimum and 3.30 maximum; and a variation at the Georgetown testing station between .98 minimum and 4.52 maximum. The Company had, I believe, been in the habit of stating its pressure as *average* day pressure 1.5 and *average* night pressure 1.7. These figures also Chairman Stevens probably had in mind without knowing what they really meant in connection with a question of minima and maxima.

It should have been apparent, even to inexperienced men, and certainly to men who claimed to be able to make a "thorough investigation," that no statement of average pressure could be any criterion as to the variations between minimum and maximum; and furthermore, that no statement of pressures at even 4 testing stations in Washington could serve as a criterion for minimum and maximum, taking into consideration any and every point in Washington. This is a statement to which I find Mr. Runyan, the Washington Inspector, is prompt to agree.

The fact that these recorded variations do not show the total variations is confirmed by records that I have before me, being the results of continuous tests made at 2 points in Washington, the test with one gauge extending between September 17th, 1905, and January 10th, 1906, and with the other gauge between October 22d, 1905, and January 10th, 1906. In the first case the minimum was .9 and the maximum 4.7, and only 2 tests showed a maximum below 3 inches; these were 2.8 and 2.9 respectively. The other gauge showed a minimum of 1.4 and a maximum of 3.9, and in only 2 tests was the maximum below 3 inches; these were each 2.9. Furthermore, there is no law or rule governing pressure in Washington, nor was there at the time of the Stevens investigation, nor has there ever been, so far as I know.

Now, in considering this pressure law, it is to be borne in mind that New York Companies can be fined $1,000 for each violation and these fines can be assessed for every test and at any and every point within the territory covered by the limiting regulation.

It is rather curious to note that, in endeavoring to support before the courts this ridiculous law, some experts for the city and State endeavored to show, that the law could be easily complied with, and one expert, H. H. Edgerton, went so far as to state that the variations could be limited to ¼ of that allowed by the law, namely, $\frac{3}{16}$ of an inch; and this, although there is a variation in pressure on Manhattan Island alone of 1½ inches, due to variation in altitude based upon a specific gravity of .6. Another expert, Prof. W. D. Marks—later to be referred to—testified that, in reading the gauges for pressures, allowance should be made for differences in altitude, and if the pressure read 2½ inches and there was a variation of ¼ inch due to altitude, the pressure should be recorded as 2 inches or 3 inches, as the case might be. Just how this will affect the question of fines has not yet been determined. Others contended that 1 inch pressure was amply sufficient for all appliances, including stoves pnd incandescent burners. So those who have to comply with the law can pay their fines and take their choice, and console themselves as best they can from these "expert" opinions.

I have but little doubt that those who were particularly concerned in the passage of this law now recognize that its enactment was a mistake; but they are not courageous enough to say so officially. Now let us see how error feeds on error. The Mayor and authorities of Detroit are now urging the passage of the same pressure law as we have in New York, and they base their arguments in favor thereof on the statement that the 1 inch and 2½ inches limitation is in force in Washington, and has been made a law for New York city.

It seems to me that the term "investigation," as applied to the efforts of the Stevens Committee and the New York Commission in connection with the New York gas companies, is a misnomer. They were not investigations, but they were prosecutions; with this difference, that the companies being investigated did not have the same opportunities to present their cases as were afforded to the lawyers on the other side, who, in the latter investigations, represented the yellow press. Professor Bemis, in the "investigation" of the Consolidated Gas Company before the Commission, although he failed to qualify as a gas expert, and finally had to be satisfied with the position of statistician and computer, in testifying consumed 6 full days. In rebuttal, I, as a qualified expert, was given by the Chairman less than 1 day. Professor Bemis was allowed to bring in reference to any and every place in connection with which he had been able to collect data. Such testimony on my part was promptly ruled out, *although this testimony in some cases*

referred to the same places in regard to which Professor Bemis had been allowed to testify.

In connection with these investigations the expenses have been very heavy, necessarily. And, furthermore, they have been unnecessarily heavy by reason of the character of many of the questions which the Commission has obliged the companies to answer.

As an example, let me quote one question which appears in the list given to the officers of the Buffalo Gas Company, a Company of which I am President, and which is now being investigated on the complaint of the Mayor asking for reduction in price, in spite of the fact that the Buffalo Gas Company has to compete with natural gas selling at 30 cents per 1,000, which is used for heating, and also for lighting with mantle burners, and the latter without right under its franchise. The question, which is simply taken as a sample, is as follows: "Statement of the number of miles of mains laid in each of the years 1848 to 1906 inclusive, which are now being used in the distribution of gas." In connection with this question let me say that the Buffalo Gas Company is a consolidation of 4 companies and many of the books of the constituent companies, reaching back to the first year named, have never been in the possession of the present Company, and if they had been preserved it is doubtful if the question could have been answered.

Apparently the Commission exercised no effort to discriminate in connection with the questions propounded, but whatever question was suggested by the complaining party the question was promptly adopted by the Commission and the Company was called upon to answer. The result was the placing upon the companies of a tremendous burden, necessitating the calling in of outside expert accountants or else neglect of the routine work and so inviting complaints on the part of the consumers. Furthermore, if outside accountants were brought in, they had to work in haste before becoming acquainted with the records and books and so errors were apt to be made. If an error was made, the Commission seemed to be ready to adopt at once the suggestion of counsel for the complainants that the records were "sophisticated"—to use a favorite term of "Expert" Marks.

Apparently the companies received insufficient credit for honest efforts made to answer the questions with all possible promptness. A question would be asked in the afternoon and an answer expected the next morning when probably the question required some days' work on the part of 2 or 3 men working night and day. Again, the same question was often repeated in a different form, and if counsel for the complainants seemed to need further time to digest a matter placed before them, they gained that time by propounding another series of questions which were adopted by the Board and certified to the Company for answers.

It may seem that some statements I am now making are exaggerations; but they are inadequate to express the actual facts. It is no exaggeration to say that the unreasonable demands made in this direction by this New York Board have already resulted in the nervous breakdown of many gas employees. On the other hand it is fair to state that the Board as a result of its experience is now occupying a far more reasonable attitude towards the Companies.

A very remarkable exhibition of non-uniformity of treatment—to speak mildly—was exhibited in connection with the taking of evidence in the Consolidated case before the United States Courts. The Secretary of the Board appeared and testified against the Gas Company, using therefor the returns of a number of the New York State Companies, *the returns having been selected for this particular purpose.* Counsel for the Company objected unless he could in turn have access to returns of all the other Companies for counter-comparisons. The stipulation was then made by the Counsel for the State and agreed to by the Secretary of the Board that the Company should have access to all returns. On this stipulation the Secretary of the Board was allowed to testify. Repeated applications to the Commission were made for access to these returns on behalf the Company, but permission was not granted and the case was closed with the stipulation not complied with.

In spite of this, Professor Bemis, acting for the State, produced on the last day of testimony taking the answers made by the Buffalo Gas Company in response to the demands of the Commissioners and these answers were used in cross examining the President of the Buffalo Gas Company, then on the stand. It is not to be forgotten that these papers were not yet public and had been placed in the hands of Professor Bemis only to enable him to familiarize himself with the Buffalo case prior to the investigation of that Company. Those who have had experience with Professor Bemis will not be surprised that he used these papers in the way stated.

It is only fair to say that the Secretary of the Board and Counsel for the State were able to show that they were not responsible for the failure to comply with the stipulation, and it is also fair to state that the Board, through its Secretary, has since informed me that they did not approve of the way in which Professor Bemis employed the Buffalo answers. I agree with the Commission that these returns are not public documents, but the rule should have been established before any of them were made public.

As throwing additional light upon Professor Bemis' "expert" evidence, in attempting to fix a value for the New York Consolidated Gas Company's business as expressed in the amouut on which it should expect a return, he considered only the assets and appraised them by methods which gave a figure at which the property could not nearly be reproduced. About the same time, in testifying for the city of Baltimore against the Gas Company, in the case of taxes on easement in the streets, he testified that the property of the Company was worth 20 times its anuual earnings or its annual earnings capitalized at 5 per cent.; there in the first case a low valuation was required, and in the second case a high valuation.

It may seem that I have strayed far away from my title. But I think I can show that many of the difficulties which we men of New York have been called upon to experience have been the result of a non-uniform system of record and account-keeping. And especially have we been injured by the published returns of the Massachusetts Companies as appearing in the annual reports of the Massachusetts Commission, *these reports not being self-explanatory* I do not claim, nor do I believe, that the adoption of any uniform system of records, accounts and returns can eliminate misinterpretation at the hands of those who are ignorant, or designing, or, most likely, both; but it is our duty towards ourselves and our fellows in the business that such of our returns as are published shall be as little as possible subject to such misinterpretation.

(To be Continued.)

Report of Committee on Standard Methods of Testing Fuel Gas Appliances, Submitted to the American Gas Institute, Chicago, October, 1906, on Behalf Ohio Gas Light Association.

Your Committee wish to recommend to the Association that our report of 1903 be amended by substituting a new report, which it is thought should be in the form of a detailed explanation and should be published in pamphlet form and supplied to all gas companies and appliance manufacturers. Considerable interest has been evidenced in the work of this Committee, and, on the other hand, many appliance manufacturers and gas companies have seemed to oppose it. Others seem to think it is the wish of this Committee that economy of operation should be considered of paramount importance to all other desired features in gas appliances. This is not the position of your Committee, for we recognize that economy alone does not determine the value of an appliance. The degree of satisfaction of results is of prime importance, and unsatisfactory results cannot in any way be compensated for by economy. We presume, however, that no gas man will disregard in the future, or has disregarded in the past, the consideration of satisfactory results secured from appliances, their artistic appearance, workmanship, ease of repairs, ease of cleaning and durability.

Many factors which go to make up the most desirable range from a commercial standpoint are matters of opinion to be determired by visual inspection. Economy is not so easily determined, and some of the foremost appliance manufacturers confess that they do not know the exact economy of the gas appliances they manufacture, the extent of the losses, or the division of these losses. High economy should not in any way interfere with other desirable features of gas appliances, and as a rule should contribute to, rather than detract from these desirable features. Your Committee assume that every manager believes it to be to his company's interest to supply the appliance which shows the highest efficiency, consistent with other desirable features.

For the benefit of those not entirely familiar with this work, it may be well to state that, until our 1903 convention, no attempt had ever been made to established standard methods for testing fuel gas appliances. Miscellaneous methods were in use which could only result in conclusions which failed to agree. The purpose of this work is to reduce the testing of fuel gas appliances to a condition where the same conclusions will be reached, no matter where, when or under what conditions the investigation is made. It is also the purpose of this work to determine what portion of available heat in the gas is made to do useful work and what portion is lost. Further, it is the intention of

this work that these losses shall be subdivided into their determining causes to enable the designer and the purchaser to curtail these losses, or, if possible, to eliminate them. The simplest means possible are recommended for this work, but your Committee realize that we are probably far from the best solution of these various problems. We are simply doing what we can, and asking for all the help which can be secured.

The field for gas fuel is practically unlimited, and the extent to which gas is used depends upon the agressiveness of the management of the gas companies, the price of gas and the efficiency and desirability of the appliances available. It is possible to materially increase the efficiency of all gas burning appliances, and your Committee believe that it is possible to open up more extensive fields for the use of additional gas in this way than could be secured by a reduction of 25 per cent. in the average selling price of gas.

The apparatus for conducting these tests is inexpensive, but sometimes an expense must be incurred by each gas company which wishes to be thoroughly informed regarding the desirability and availability of various gas appliances. This expense, however, is insignificant compared with the great benefits which can be secured by this knowledge. Compare if you will the expense of research work on this problem with a material reduction in the price you are charging for gas, and the insignificance of this expense will be made apparent.

With this explanation will take up the detailed methods of doing this work, and it will be the aim of your Committee to outline the methods they recommend in a way intended to be intelligible to the man who does not enjoy a technical education, and in a way which will enable this work to be taken up by an ordinary workman without demanding more than minimum attention from the manager or engineer wishing to adopt these standard methods.

HENRY L. DOHERTY, Chairman,
F. W. STONE,
JOHN FRANKLIN,
} Committee.

Gas Supply.—The first essential is a gas of known calorific value, and as this value is apt to vary considerably, great care must be exercised or a serious error will be introduced right at the start. It will be found that the calorific value of the street gas varies more at certain hours of the day than at another, and the tests should be run at the time when the variation is found to be the least.

The second essential is that the supply be of constant pressure, and as 2 inches of water is generally accepted as the desired pressure at which gas should be supplied to consumers' premises, your Committee recommend that the supply of gas for testing purposes should be at this pressure. It is not, however, so important that the exact pressure recommended should be used, as it is necessary that whatever pressure is used should be a constant and not a variable one.

Some misapprehension seems to exist regarding the efficiency of Bunsen burners supplied at a higher or lower pressure. Generally speaking, best results can be obtained at the higher pressures. This is due to the increased potential energy dependent on this higher pressure, which secures higher inductive effects and a more intimate mixture of gas and air, also the condition necessary for a high flame temperature. To secure these results, however, the gas must be checked only by the size and nature of the gas orifice, and where a fixed gas orifice is used and the pressure reduced by a stopcock no gain is secured by the higher pressure. No matter what the pressure may be behind the stopcock, the velocity or rate of flow of the gas through the orifice is fixed only by the excess of pressure immediately back of the orifice over that of the atmosphere, and if it is desired to reduce the rate of flow from, say 20 to 5 feet, it is accomplished by reducing the pressure of gas on the orifice by partially closing the stopcock. The velocity of the gas issuing from the orifice would be the same (neglecting the effect of eddy currents) whether this reduction of pressure is secured at the stopcock immediately behind the orifice or at the works several miles away. Assuming that the orifice will be of constant size, the effect of high pressure is, therefore, only manifested in the maximum velocity of the gas which will be passed by the orifice.

The space occupied by a given weight of gas will vary as the absolute pressure. Therefore, the pressure to which the gas is subjected during measurement would introduce a slight error. At sea level the pressure of the gas would be 14.7 pounds per square inch, or 480 inches of water, so that a variation of 1 inch in pressure would only affect the measurement to about 2 per cent., which is negligible. But the same variation in pressure would make a considerable difference in the amount of gas passed by the orifice; that is, an appliance which is furnished with an orifice intended to pass say 35 feet per hour under 2 inches water pressure would, with a slight variation of this pressure, pass several feet more or less in that time, causing an increase or decrease in the temperature of the appliance under consideration, and as it invariably required the lapse of some time to obtain constant conditions, which are necessary for a test, it is imperative that the rate of flow should remain constant. As it is seldom possible to get constant pressure, unless tests are conducted at the works, it is absolutely essential that a good and reliable gas pressure regulator should be used, and for uniformity this regulator should be adjusted to deliver gas at a pressure of 2 inches of water.

Water Supply.—It is equally important that constancy of water supply, which is used for absorbing the heat of the gas, should be observed. It is to be desired that the water shall be supplied at a constant pressure and a constant temperature. The temperature of the water from city mains is usually approximately constant, provided it is not conducted through heated rooms, and even then it can generally be secured at a constant temperature by allowing it to flow for some time at a constant rate, and the variation in temperature will thus be reduced to a negligible quantity or the effect of this change in temperature can be established with reasonable accuracy.

If, however, the pressure is not constant, the requisite temperature conditions cannot be obtained, for as velocity of water flowing through an orifice being theoretically equal to the square root of 2GH, any variation in the head H, or pressure, will cause a proportionate change in the rate of flow. As a change of velocity or quantity will change the differential temperature through the absorbing changer of the appliance under test, this change may cause an appreciable error, for there is always more or less capacity to hold heat, and unless the test is started and stopped with the same temperature conditions prevailing, error is occasioned to the extent of the thermal capacity of the apparatus. A simple and very effective method of maintaining a constant head is by the means of a flush tank with a float valve, but with siphon removed, as illustrated in Fig. 1. This tank should be placed high up

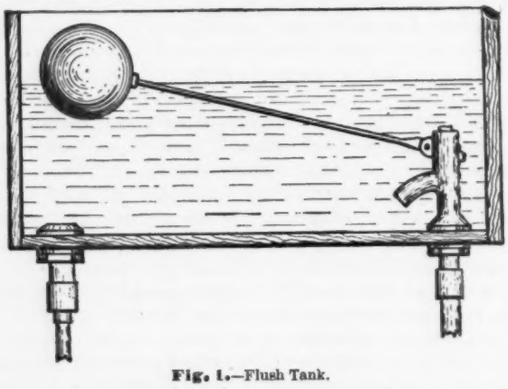


Fig. 1.—Flush Tank.

in the testing room and connection made with the city service or other available water supply, the head of which will always be sufficient to supply the tank at the height at which it is placed. The water for testing is drawn from the bottom of the tank, and the float valve admits as much water as is withdrawn and maintains the head at practically a uniform level. With this arrangement, as diagrammed, very satisfactory results have been obtained in one of the testing rooms established on the lines recommended by this Committee at the 1903 convention.

SCOPE OF REPORT AND CLASSIFICATION OF APPARATUS.

No attempt will be made at this time to prescribe standard methods for testing the industrial gas appliances, such as braziers, forges and tempering furnaces, the Committee believing that only the standard domestic appliances can be advantageously considered at this time. Our report will, therefore, cover only water heaters and gas ranges, specifying methods for determining how much of the heat is usefully employed, positive or comparative methods for determining the extent and division of the losses, and explanation regarding some of those losses which are calculated to assist experimenters and possibly some designers. For the sake of convenience, the following classification is made:

- Water heaters
  - Circulating.
  - Instantaneous.
    - Direct.
    - Indirect.
- Ranges
  - Top burner.
    - Regular.
    - Simmering.
    - Giant.
  - Oven.
  - Broiler.

Circulating water heaters, being that class of heaters ordinarily termed independent heaters, and by preference designated a circulating heater by the nature of its operation, which is due to circulation produced by the action of the heater regardless of pressure conditions. Direct instantaneous water heaters, or that class of heaters where the products of combustion come in direct contact with the water; and the indirect instantaneous heaters, being that class of heaters where the heat is transmitted through a metal wall, generally a tube, through which the water flows, and which are frequently controlled by an automatic valve and are operated under service pressure conditions.

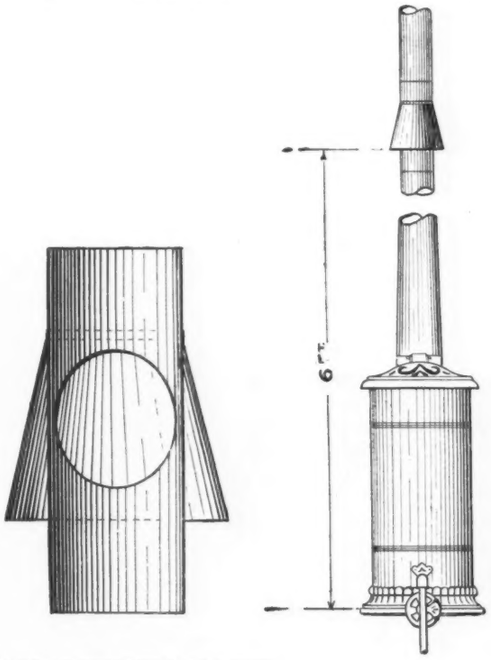
The range top burners are usually of three sizes, which may be classed as: Regular, being, as the name implies, the ordinary or medium size, of which there are usually three on a range; simmering, or the very small burner, sometimes placed in conjunction with one of larger size and intended to keep a vessel hot which has been brought to the desired temperature over a larger burner; and the giant, being a burner of larger capacity than the regular, and intended for heavy or fast work. The range oven is essentially an inclosed chamber which may be evenly heated to any temperature required for domestic baking. The range broiler as usually constructed is also an inclosed chamber, which is placed either below the oven or elsewhere, and while an even distribution of heat would be in no way objectionable, the fact that a very high temperature is required to do this work probably explains the reason for broiling being usually done on one side of the piece of meat at a time, it being possible in this way to get good results with simpler mechanical construction than where all sides are cooked at once.

Circulating Water Heaters.—The circulating water heater, barring the direct instantaneous water heater, is the most efficient gas appliance now available, and yet its efficiency can be materially improved. The efficiency of a circulating water heater will vary with the rate of circulation through it, and it is, therefore, important that for highest efficiency, freedom of circulation should be considered. The reason for the higher efficiency of a circulating water heater having the freest possible circulation is due to the fact that a greater differential temperature is maintained between the products of combustion and the water being heated. The general rule is to consider that the amount of heat absorbed per unit of heating surface is exactly proportional to this difference in temperature. If a free circulation is secured, the rise in temperature of the water passing through the heater will be perhaps not to exceed 20°, and it is also apparent that the less the rise in temperature the less will be the heat lost by radiation while the water is being transferred through the connecting pipe to the boiler and after it is in the boiler. It is possible to have this circulation so free that the rise in temperature of the water passing through the heater will not be sufficient for the purpose for which it is to be used, and some manufacturers have purposely congested the circulation of the water in their heaters so that a much smaller quantity of water is secured, but at a higher temperature. It is easily possible to congest the circulation in those heaters yielding free circulation, but not possible to give free circulation to those heaters offering considerable obstruction to the passage of water. We, therefore, think that manufacturers should design their heaters for free circulation.

Another consideration is this: Free circulation will be apt to materially increase the life of a heater where water is used containing considerable solid matter. The bulk of this solid matter is not deposited as a rule until the temperature approaches the boiling point; and again, if the circulation is free and rapid this deposition of solid matter, often though it occurs, will be carried over and the deposit will occur in the bottom of the boiler where it will not obstruct the passage of heat to the water and not curtail the efficiency of the heater by ageing, as is now evidenced by some of the water heaters in everyday use.

Although out of place in a report of this sort, it is well to call attention to the fact that the gas manager desiring to secure economical results in the use of domestic water heaters may find it advantageous to recommend the use of a supplemental boiler into which the water from the street mains will first flow and will be given an opportunity to take the temperature of the room before flowing to the heater. The highest efficiency heaters now on the market give a rise in temperature of from 30° to 40° in the water passing through the heater. This rise is often insufficient and requires that the heater be operated for a sufficient length of time to enable the entire contents of the boiler to be passed through the heater a second time.

The losses prevalent in present water heaters are due to over-ventilation and excessive flue temperature, and it is upon these two points that the manufacturers of the best appliances have made the most important improvement over others. Your Committee advise against ever connecting these heaters to a flue, except that a broken flue pipe be used, such as is designated in Fig. 2, and we recommend that this canopy be



Vertical Section Through Diameter of Canopy.

Fig. 2.—Method of Connecting Canopy to Heater.

placed at approximately 6 feet above the burner regardless of the length of the heater. Lack of draft in the chimney without the use of this canopy may cause the heater to smother, and excessive draft will draw in an immense quantity of air, far beyond the amount needed for proper combustion, and this excess air will rob the water of a considerable quantity of heat which it would otherwise secure.

Then there is one point which the manufacturers of gas water heaters have avoided, and though it is not probable that they have overlooked this possibility, they have not to our knowledge secured the results. As you all know, manufactured gas contains a considerable quantity of hydrogen. During combustion this hydrogen combines with oxygen to form H_2O. The heat of combustion of hydrogen is greater than that of any other gas, but unless each pound of H_2O which is formed is condensed before leaving the apparatus, it will carry with it at least 965 B.T.U. of heat. If this moisture or steam were condensed within the apparatus and the water of condensation removed without its being allowed to fall back upon the heated metal of the interior (in which case it would be re-evaporated), this latent heat might be saved. The flue gases will, of course, pass off saturated, but at a temperature of say 180° they would contain about 2 per cent. of moisture by weight, while at 212° the amount of vapor carried off might be infinite. Usually there would be a pound of water formed by each 15 to 20 feet of gas consumed, or approximately 1 ounce of water to a foot of gas, while with no over-ventilation and a flue temperature of 180°, only about .0003 pounds of water vapor would be carried off for each foot of gas burned. Thus it is evident that practically the total latent heat of water vapor might be saved. Besides the economy, which would be about 60 heat units saved for each foot of gas consumed, all objectionable moisture would be removed from the room and flue, and as the formation of moisture is one of the most objectionable features of water heaters, this would be a very desirable improvement. Summed up, it would seem that the ideal water heater, in which perfect combustion took place with little over-ventilation and from which the products of combustion were expelled at a temperature somewhat below the boiling point of water, would require no flue, for these water heaters are usually placed in large and well ventilated rooms, and as there would be in this case neither moisture nor odor, a small amount of carbonic acid gas would not be a serious objection in the room.

Method of Testing Circulating Water Heaters.—The heater to be tested is connected with a 30-gallon boiler, as shown in Fig. 3, with 1-inch pipe, a thermometer being placed in the horizontal pipes at the top and bottom, and valves *A* and *B*, in each of the vertical sections close to the boiler, and a valve *C* in the lower horizontal pipe. The heater is set so that the burner is 4 feet below the top of the boiler and a flue used extending 6 feet above the burner.

The water supply, which must have constant head, is connected in

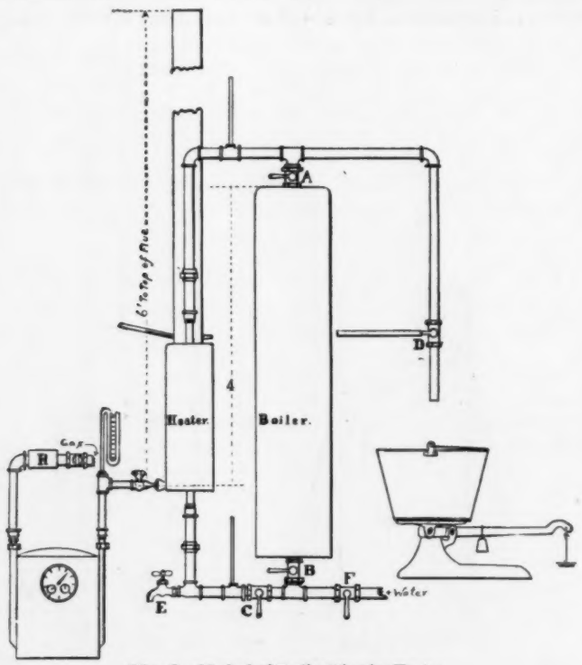


Fig. 3.—Method of Testing Circular Heater.

line with the lower horizontal pipe to the heater, as shown, and should have a cock, *F*, in it, by which the whole system may be shut off. A big cock, *E*, is placed on a tee at the junction of the lower horizontal pipe and the riser to the heater, by which the whole system may be drained, or by closing the cock, *C*, in the lower horizontal pipe, the heater may be drained when a change is made. The outlet pipe is connected in line with the upper horizontal pipe and then brought down to such a height that the overflow may be conveniently caught in a bucket placed upon scales. At the lower end of the overflow pipe is a special cock, *D*, capable of accurate adjustment, by which the flow of water may be regulated. This cock, which is illustrated in section in Fig. 4, is an ordinary lever cock with the slots filed diagonally, as shown, so that a very gradual closing or opening may be obtained with the assistance of 18 inches of gas pipe, which is driven on to the lever after it has been filed to an approximate fit. The gas is measured by a test meter, and a good regulator, *R*, is placed back of it to assure constant pressure.

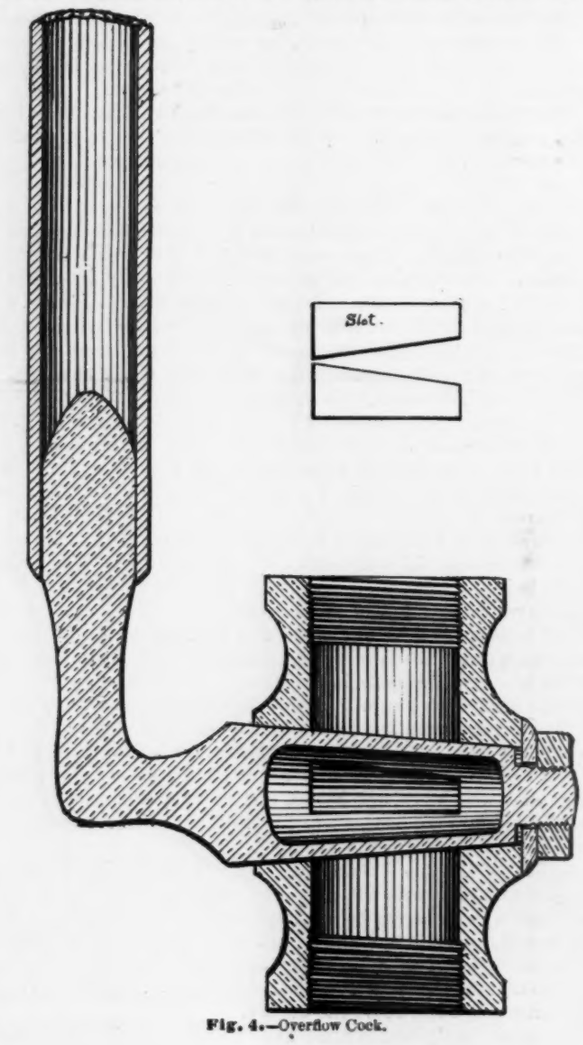


Fig. 4.—Overflow Cock.

The first test of a heater is to determine the efficiency by natural circulation. This is done by lighting the heater, using the maximum flow of gas and noting the differential temperature of the thermometers at the end of 10 minutes. The overflow valve, *D*, only being closed during this test, valve *F* must be open. Then open the overflow valve, *D*, and cut the boiler out by closing the valves, *A* and *D*, at the top and bottom of it. Adjust the flow of water by valve, *D*, to such a rate that the same difference of temperature is obtained that was observed at the end of the 10 minutes' run.

Fig. 5.—Method of Inserting the Thermometer.

When this temperature is obtained and has been maintained long enough to show that stationary conditions have been established, weigh off a quantity, say 20 pounds, of water, observing the amount of gas used during this time. The weight of this water, times its rise in temperature, will give the B.T.U.'s collected, and this product, divided by the total B.T.U.'s in the gas measured, will give the efficiency of the heater in per cent. under working conditions. As no two makes of heaters are built to use exactly the same amount of gas, it is desirable to have a test by which they may be compared, and this is obtained as follows:

The heater, as above, is allowed the maximum supply of gas, but the differential temperature is adjusted to 50° by the rate of flow of the water, and the efficiency determined as before. Tests are made for each multiple of 5 feet of gas per hour, from the maximum down to 10 feet. By plotting curves of the results as found an accurate comparison of efficiency and capacity may be obtained. Fig. 6 shows how this may be done. If the actual calorific value of the gas is not known and cannot readily be determined, an arbitrary value may be assumed and the results will then be comparative only; but a comparison is all that is necessary for the buyer. Artificial gas will usually give about 650 B.T.U.'s per foot, and this figure may be generally used where the exact calorific value is not known and great accuracy is not required.

Ageing Test.—Another valuable test to make on circulating water heaters is to connect them to a tank or tanks, from which the water is withdrawn with sufficient rapidity to prevent overheating in the same manner as in domestic use. Then run them several hours each day, alike, and make monthly determinations of their efficiency. It will be found that some heaters stop up much sooner than others; and in localities, where considerable precipitate is formed, it may be impossible to use certain heaters, even though their efficiency is very high when new.

Instantaneous Water Heaters.—The direct, instantaneous water heater, or those in which the products of combustion come in direct contact with the water, must necessarily be operated without back pressure. This class has the greater advantage of a very low thermal capacity, of condensing much of the water vapor formed by combustion, where water somewhat below the boiling point is being withdrawn,

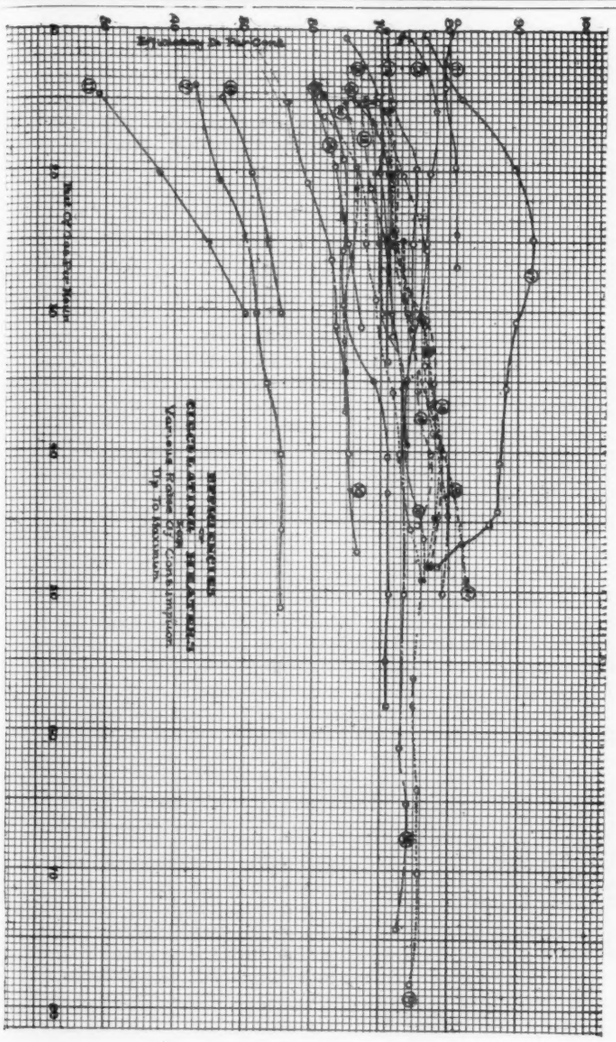


Fig. 6.

making it possible to obtain much higher efficiency than by the indirect method and for the same capacity, less size and cost, than for the indirect heaters. While again there are several disadvantages, the heater must be placed near the point where the water is to be used, it being necessary to regulate the supply at the heater. This is sometimes prohibitive, and if very hot water—that is, water near the boiling point—is required, there is an excessive loss in the flue, for as it is impossible for all the water to reach exactly the same temperature, when passing through the heater, the temperature of some will exceed the boiling point, and as it is not confined will be lost up the flue as steam.

The indirect instantaneous water heater may have the advantage of being automatic, of being placed in any convenient location, regardless of where the water is to be used, and it may be adjusted so that water which is almost boiling, and in fact even steam may be obtained. Being under higher pressure, a high temperature can be maintained without formation of steam. Under an absolute pressure of 14.7 pounds, the formation of steam takes place at a temperature of 212°; if this pressure is increased the boiling point is raised, which makes it evident that where an indirect heater is used under say 60 pounds gauge pressure, or 74.8 pounds absolute pressure, the boiling point is 307°, so that the temperature of the water in the heater may be raised above the atmospheric boiling point without the formation of steam on the interior of the heater. It is apparent that each heater has its advantages, and both classes give excellent results where properly applied. Where very hot water is required, or where it is convenient to have the heater at the place where the hot water is used, or where hot water is wanted at several places, the indirect heater is superior; but if water somewhat below the boiling point is to be used, such as for the bath or washing, etc., much higher efficiency may be expected from the direct heater, with less space occupied and less cost of installation. Both have the very serious disadvantage of an excessive gas demand, which may necessitate the installation of an abnormally large service and meter for the consumer whose monthly bills are below normal.

(To be Continued.)

How to Create Efficient Employees.

[A paper read by Mr. E. N. Wrightington at the January meeting of the National Commercial Gas Association.]

I approach this subject with considerable diffidence, and feel more like asking for advice than attempting to give it, as my experience with the subject in any large way has been of short duration, and the more I learn about it the less I feel I know. It may, however, be interesting to some of the members of this Association to learn of our experiences in Boston with the employees of the newly formed commercial department of the Boston Consolidated Gas Company.

On July 1, 1905, the gas companies formerly doing business in Boston and Brookline were consolidated under the name of the Boston Consolidated Gas Company. At the same time a sales or commercial department was formed. This force consisted of about 50 employees—representatives, special men on power and fuel, office clerks, etc. The history of the development of the personnel of this organization may offer some suggestions to you, and this experience forms the basis for this paper.

In the first place, we had to begin right from the start with practically an absolutely untried set of men, with only a few of any experience in the sales' end of the gas business. There was not even a nucleus around which to form a department. The proper selection of the men to form the new department was, therefore, of the utmost importance. This matter of looking over a number of applicants for sales' work and picking out those one thinks ought to make the best men, is a source of continual surprise to me. One applies the regular formula in this sort of thing—that a man must be of good address and appearance, talk intelligently, but not too much, be quick and snappy in manner, and in general give just that impression to the employer which one wants the customer to get.

The strange thing about this selection of men is that sometimes those who conform to the above standard turn out to be dismal failures, while I have had men who by every rule should undertake anything else but this kind of work, and yet have some characteristic that makes me feel inclined to give them a chance, who ultimately make the greatest success.

Personally, I don't care much about the sales experience a man may have had, especially if it is that experience which makes the kind that has "sold goods all his life," and knows more about the business than anyone else can teach him. I find that often the most successful salesman turns out to be the young man of little or no experience, but with the right kind of ability, who has enough ambition to apply himself to a study of this big question of salesmanship and a determination to make himself proficient in its application.

After the selection of the men we introduced our method of instruction. This began, first, with a series of lectures by the heads of the several divisions of the business, namely: Manufacture, distribution, appliances, gas engines, complaints, general policy. A free discussion followed each lecture, and the men were thus made familiar with the general details of the gas business. The lectures were afterward incorporated in pamphlet form for the use of men taken on later.

After the course of lectures the men were put right out on the road. Each man was given a district for which he was to be held responsible and told to get results. Besides the regular daily morning gatherings, we had monthly meetings of the force, to talk over means of getting more business and to discuss experiences. The monthly meetings, which have since been changed to weekly, are a very decided help, not only in the instruction of the men but in knitting the organization more closely together. The best men are selected to lead these meetings in turn, and various timely topics are talked over. We sometimes arrange to have one of the men endeavor to sell another a gas range or a gas arc in order to draw out the arguments pro and con with which we want our men to be familiar.

Another great help in the teaching of the men is what we call the "Representatives' Book." This is really a book of instructions, but it contains considerable information of a general nature as well. The contents are as follows: The original lectures on the various divisions of the gas business, general instructions as to filling out the information cards, which we require for each location in Boston, instructions as to new services, repairs and replacements of piping, leaks of gas, permits and petitions to lay mains, gas engines, piping of buildings, meters, gas bills, new buildings, complaints, stoves, applications, etc. Other matter consists of pamphlets as follows: Arguments in favor of gas, and some popular fallacies exposed, being a statement of the advantages of using gas and a refutation of certain claims made against gas, such as vitiating the air and poisoning the atmosphere. In other pamphlets are stated the advantages of gas for cooking. Another con-

tains facts and figures on the price of gas and improvements in the service. Another has a list of hundreds of uses for gas, arranged alphabetically by name, and also by the kind of business for which the method is applicable. Edison bills and contracts are treated in another division of the book, and comparative tables shown of the cost of lighting with gas, or using gas for gas engines to make power and electric light, as compared with corresponding costs with Edison service. Loose leaf catalogues and price lists of appliances are other features. Each book has a complete tickler system, by which each salesman carries ahead the dates for calling on his various opportunities.

Perhaps the most interesting feature is a set of reproductions of complimentary letters, which we have collected, of customers who have lately changed over from electricity to gas, either for lighting or for gas engines. These letters are very convincing testimony to a prospective customer. A new organization has lately been formed, which I expect will have a very great influence on the development of the men, and that is what we call the "Commercial Club." The Club has been formed by the members of the department and is absolutely under their own control, all the officers being chosen from the ranks. The object is to promote good feeling among the men by bringing them in contact with each other in a social way, but at the same time they propose to introduce features of general interest; such as lectures by prominent men, on matters even outside the gas business. In this way we hope to see their interests broaden generally, and by this social intercourse a feeling of pride in their department and of loyalty to their company developed.

The matter of compensation is of importance in the development of a sales' department. Gas men have now come to recognize that the commercial possibilities of the business depend upon the sales' department. The success of the sales' department, in the last analysis, depends upon what kind of men are employed in it. In order to bring into the department and develop the type of man who will get results in this work, it is essential that the remuneration be made attractive. The nearer we can get to payment for a man's services based on what new business he brings in to the company, the more efficient our force will be. The value of this new business should be based, not only on increase in customers or gas appliances, or even gas consumption alone, but on the final test of all—that increase of gas consumption which will place the least burden upon our plant capacity. If the rate of compensation could be traced back so as to be made proportional to that kind of an increase in gas consumption we would have the ideal basis. So many factors enter into this calculation that we can probably in practice only approach that perfect apportionment and never actually reach it. At the present time we are paying a flat salary, but we are considering the best practical method of dealing with this very important subject. There can be no doubt at all that some kind of a commission basis must be used in order to offer that additional financial incentive which most men require in order to produce the most effective results.

A feature of considerable help is the opportunity given to men of the department to be present at the dinner given to the Heads of Department each month. This monthly meeting is given over to a discussion of some of the various problems of the business. The subject is chosen and the meeting placed in the hands of one of the heads. These gatherings are extremely interesting and of great assistance in welding the different interests of the organization together. For the members of the Sales' Department, who have the privilege of attending, they are particularly instructive in showing the numerous details of the business and what a determined effort is being made to bring each department up to its highest point of efficiency.

Another help to the department, and a particular source of encouragement in their work, is our profit sharing fund. This fund applies generally to all the employees of the company who have shown proficiency and industry, and consists of 7 per cent. of the annual salary supplied in the form of preferred stock in the Massachusetts Gas Companies, This division of profits marks an important step in advance by giving employees a decided financial interest in the success of their company.

A final word on what I consider the most important element for success in the development of such a department as I have described; that is—enthusiasm. A month or two ago we made a special offer that we would give 5,000 feet of gas free with every gas arc sold before January 1st. This offer turned out to be a great success, but I am of the private opinion that the effect of the offer on the department was responsible for more sales than the effect on the customer of the saving represented. It gave the men enthusiasm to go after business, it gave them a good opening to talk gas, and it made them feel that they had an especially attractive proposition to present. Now, we don't want to have to make special propositions all the time in order to keep up the spirit of our men, but it shows the importance of creating this enthusiasm in their work in some way. This we try to do; we advance a man's salary before he has to ask for it; we show the advantages of using gas in any way we can think of, and we have those successful in getting an important bit of new business describe their success in securing it. The letters from customers stating their experience since gas was put in, as compared to their former electric service, have been perhaps of the most importance in developing this feeling of enthusiasm. We are very far from having achieved anything like its possibilities—some of the men have hardly a sympton of it—but I thoroughly believe that without it no sales department can be successful.

Water Heaters as an Outlet for Gas Companies' Product.

[A paper read by MR. R. C. FRAMPTON at the January meeting of the National Commercial Gas Association.]

Some 10 or 15 years ago bathing was considered somewhat in the light of a "luxury," but now it is considered a pleasure and a necessary privilege. The ordinary American nowadays considers a bath a day, or at least one every other day, requisite to his personal health and comfort.

Nothing else, of course, is so conducive to comfortable, healthy bathing as a convenient and generous supply of hot water, and this has all resulted in the creating of a wonderful demand for water heating devices. The ordinary tank with its *coal range* waterback attachment fell far short of supplying a dependable and satisfactory hot water service, particularly in summer time, The successful employment of gas for cooking and other fuel purposes readily indicated its great adaptability for water heating uses, and the automatic instantaneous gas water heater was invented. The apparatus when first introduced naturally met with a slow reception. It was not only much higher in price than the ordinary $10 or $15 heater, but people were skeptical as to whether or not the machine could perform the wonderful results clamed for it. Fortunately, however, the device had been practically perfected in the *natural* gas territories, where *everyone* burns gas, and where conditions are peculiarly favorable to the development and testing out of gas appliances, and it was, therefore, presented to the gas fraternity at large as a practical and successful machine. To illustrate the progress made. The sale of these heaters in the year 1904, when first *actively* introduced in the artificial gas territories, reached a total of less than 2,000 machines, but the sales for the year 1906 as known have exceeded a grand total of over 5,000 machines, all working on *artificial* gas, and *not* including those sold for *natural* gas.

Many of the brightest gas men at once realized the great possibilities of the device, and quite a good deal of the success attained is due to the energetic and cordial support given by their companies. Many other gas men, who have found through experience that the apparatus is a really economical and practical machine, first raised the following objections to the handling of automatic gas water heaters:

They said: "They are too high in price for our customers;" but experience is proving that one heater sells another, and that when people once realize the wonderful convenience and economy of the machine, they are willing to pay the $100 purchase price.

Other gas men said: "Our gas services are too small, and the putting in of an automatic water heater means the expense of a new service, also the setting of a larger meter." It is necessary, then, to figure out for them that the increased use of gas for water heating purposes, rather than the use of coal, will repay for the additional outlay many times over, and with *no* extra expense for maintenance or distribution.

Still others said: "Well, we don't want to be subjected to any of the annoyances that might result from having automatic gas water heaters installed on our mains," thinking that, in case of any derangement or needed adjustment, they would be called upon to attend to it. Before the heaters and sales' methods were perfected to the present point, this, to a certain extent, held true, but with the perfection of the device it was found that repairs or adjustments were reduced to a minimum, and that people in general very readily learned the operation of their heater. Besides this, the establishing of branch offices and trained agencies, that attended to the adjusting and repairing of heaters, eliminated this objection entirely.

The use of the automatic gas water heater has accomplished one peculiar, yet unusual, advantage for gas companies; that is, the successful use of gas for water heating purposes in *winter time*. The great advantage of having hot water always available through the mere turning of any hot water faucet, gradually educates people to a high

standard of hot water service, and as a very large proportion of these heaters are installed under what is known as the automatic re-heating system, they are still continued in operation as an *auxiliary* system even in winter time, when the usual coal range might be put in operation with its water back attachment. All water passing *from* the tank is thus fed *through* the heater *before* passing *to* fixtures, so that when additional heat is needed in the water it is *automatically added* at heater, and sufficient gas is burned to thus supplement the ordinary coal tank system with its intermittent and spasmodic hot water supply. This guarantees the user an *ever ready* and *inexhaustible* hot water service, with the consequent profit to the gas company. The user is willing to pay for the additional gas used, because he gets such *excellent* returns on his investment. Automatic gas water heaters usually go into the better class of homes, and when $100 is invested in a heater the money is spent with the intention of securing comfort and plenty of hot water. This educates people to a very *liberal* use of hot water. They are willing to pay for more gas because they get their money's worth. They get a hot water service that is a source of *real* comfort and convenience.

Many users who had become wedded to the gas range and desired to use it throughout the winter season as well as in the warm weather months, found in the automatic water heater a worthy companion to the range, and they thus depend *entirely on gas* for cooking and water heating purposes. Where the heating of kitchen is provided for from the regular furnace or house heater, and no necessity for coal fire heat in kitchen exists, this combination of highest efficiency and service (gas range and automatic gas water heater) is coming into use with consequent great benefit to gas companies.

Experience in different cities has shown that under this scheme the average fuel gas consumption throughout an entire year, for the ordinary family having 5 adults, would amount to approximately $70 worth of gas.

How much better to educate customers to the continuous use of the gas range and automatic water heater, than to have them give a considerable portion of their fuel outlay to the coal man, and permitting coal to perform those functions that justly belong to the gas range and automatic heater, by right of convenience, economy and superior service?

The total elimination of the coal range has long been the dream of the commercial gas man. The gas range in itself alone usually failed to accomplish the result, but the combination of automatic water heater and range makes possible this desideratum. When considered in this aspect, the vital importance (to gas companies) of the automatic gas water heater can hardly be overestimated.

A pleased constituency is a gas company's best asset, and experience is proving that automatic gas water heaters help make *satisfied* customers. The device is not only a convenient one, but remarkably economical, in the sense that a very *generous* supply of hot water is furnished with relatively small consumption of gas. The average man does not begrudge $3 or $5 per month for gas to operate his automatic gas water heater, considering the inexhaustible and ever-ready service received, and that he actually gets from 60 to 80 gallons of scalding hot water per day.

Many large households even resort to the expedient of putting a large tank in the basement, with coal water heater attachment, depending upon the servants to fire this little furnace winter and summer, putting up with the dirt, radiation and annoyance of such a system, rather than stand for *inadequate* hot water service. *Many hundreds* of these coal heating systems have been later displaced by automatic gas water heaters.

Many shrewd gas men believe that gas for *fuel* uses is destined to become the great issue, and that in a few years the use of gas for heating and power purposes will constitute the backbone of the gas business. Gas companies can do much to popularize the use of gas for water heating purposes and accelerate the adoption of automatic gas water heaters by rendering that co-operation which is quite necessary. The proposition is certainly a mutual one. The manufacturer's profit is simply the first profit on the sale of the apparatus, but the gas company's profit is sure and certain and continues for many, many years. The apparatus being constructed of brass and copper throughout its working parts, has a life of 15 years and upwards, with but few repairs or replacements. When a man once becomes accustomed to the *perfect hot water service* secured from an automatic gas water heater, he is seldom ever content to put up with the discomfort and inconvenience of a less perfect service. This is proven by the large number of people who have bought heaters and then afterwards moved to another section of the country, when they immediately arranged for the installation of an automatic gas water heater in their new home. This is also proven by the fact that a large number of people who bought automatic gas water heaters when first placed on the market in an imperfect condition, later purchased the new improved heaters rather than do without the perfect service afforded.

It is exceedingly difficult for manufacturers to suggest exactly what assistance should be rendered by gas companies into whose territory the appliance is being introduced. It might not be amiss to mention some of the co operative methods used by a number of the more prominent gas companies to promote the sale of automatic water heaters.

Very *few* of the important gas companies now refuse to furnish free gas services or to set proper size meters free of charge for the successful operation of the automatic water heater. A large proportion of the prominent gas companies furnish free gas connections right up to the heaters on all machines installed on their lines. Others furnish free gas connections right up to the heaters on all machines installed in *old* houses, but not in new houses. Practically all of the gas companies are willing to inclose stickers furnished by manufacturers along with their monthly bills to customers. Quite a large number of companies fit up and exhibit heaters in active operation in their display rooms, and in addition to having their demonstrators always give a careful explanation of the advantages of the heater, they furthermore turn over the names of the good prospects to the water heater agents or the branch offices represented in their district, with the request that they follow up the prospect and secure the order. They also train their solicitors to talk and sell automatic water heaters.

Some companies not only furnish free gas services and connections to heaters, but also furnish free *water* connections to the machine, thus connecting same up in perfect working order, complete.

To sum up the gas company co-operative methods, the following have proven the most effective:

1. The exhibiting of a sample heater in operation in gas company office or display room, with consequent recommendations for its use to consumers, both by demonstrators and the outside solicitors.

2. The display of signs, calling attention to the new method of heating water with gas, and the sending out of stickers and circular matter along with gas bills.

3. Setting proper size of meters and the running of proper size gas service and gas connections free to heater.

4. The sending in of names of good prospects to either the branch or home offices of the water heater manufacturers, so that these inquiries can be turned into sales by an intelligent follow-up system.

With such assistance the prospects of the automatic gas water heater are simply immense. The apparatus is destined to have a remarkable influence upon the popularizing of the use of gas for fuel purposes, and a satisfactorily increased gas consumption is conceded by many of the shrewdest gas men in the country.

[Translated for the JOURNAL by MR. FREDERIC EGNER.]

The Vertical Retort Oven and the Future of Gas Making.[1] No. III.

By DIRECTOR EISELE, of Cassel, Germany.

Bryson, of the Pumpherston Oil Works, used straight retorts, open at the bottom, and employed a mechanical coke breaker to remove the residue in the retorts. From this machine the pieces of coke would drop into a chamber, which was periodically opened and the coke removed, similar to the Young and Glover oven, Fig. 7.[2] Other variations appeared during the year which are of no interest here. Carpenter's system of vertical retorts, as described in an English patent specification, shows a remarkable solution of the difficulties accompanying the removal of coke. The German Saxon-Thuringian oil industry gasifies its oil shale in vertical retorts also, but these have inserted upon the inside a slat shutter-like pipe, which would hardly be applicable in the manufacture of illuminating gas. The most modern vertical retort oven construction is found in the devices and proposed designs of British gas engineers—Herring's (Fig. 6) and Young and Glover's (Fig. 7). Herring's system is also shown in the AMERICAN GAS LIGHT JOURNAL, Vol. LXXXIV., p. 222. These two independently evolved constructions show to begin with an almost identical natural simplicity in outward appearance; which in section reminds one of an iron furnace and whose strong foundations give one an impression of real solidity. The interiors of these ovens agree in arrangement with each other also, and both seek to carry out the continuous production and removal of gas and approximately of the coke in a cold, slaked condition. This is accomplished by having water or steam meet the downward moving approaching coke, which steam, after performing its work,

1. *Jour fur Gasbeleuchtung.* 2. See JOURNAL, Vol. LXXXV., p. 145.

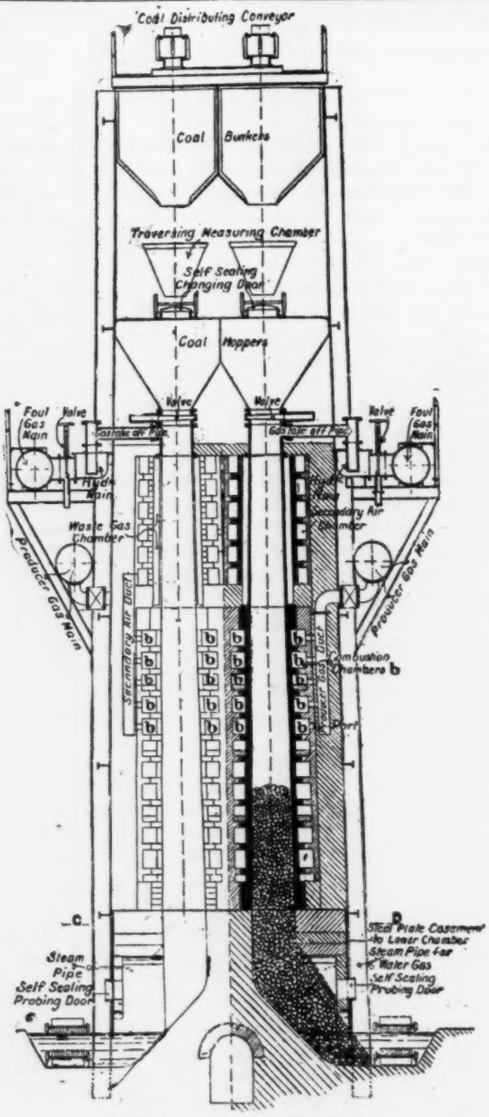


Fig. 6.—Herring's Vertikale Retorte.

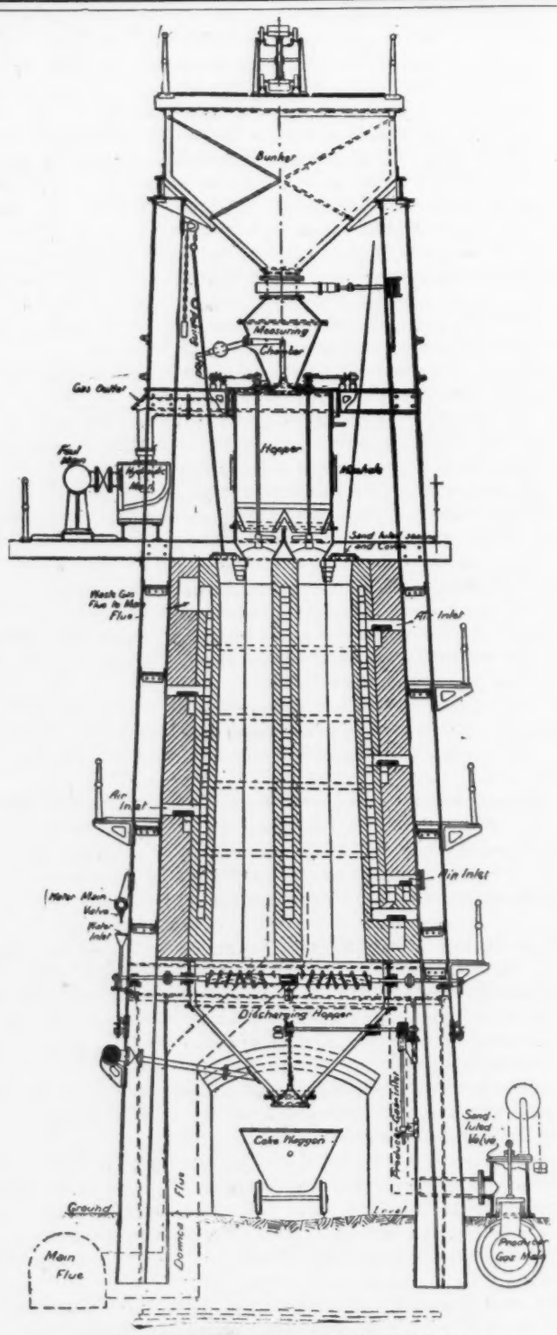


Fig. 7.—Yourg and Glover's Vertikale Retorte.

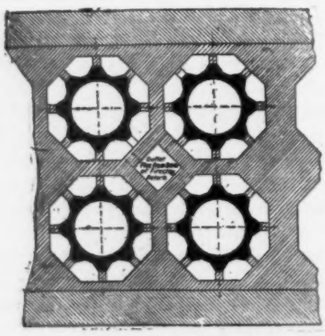


Fig. 8.—Querschnitt zu Fig. 7.

ascends through the incandescent coke, being decomposed and forming water or coke gas. Only in the details of the method of filling and emptying the retorts do these ovens differ. In the Herring bench the retorts are emptied by the lower ends curving outward toward the side, where the coke is then made to pass through a water seal. In the Young and Glover bench the descending coke cake is torn away as it issues from the retorts and broken into pieces by a coke breaker, which drops the pieces into an intermediary chamber, from which it is removed periodically through an otherwise tightly closed door. The illustrations make a further description of these proposed systems unnecessary. See Fig. 8, which is a section of Fig. 7.

As to which of the vertical retort bench systems is correct, the one promising the best results, or the one worthiest of recommendation, I declare my inability to declare. Regarding the Settle-Padfield system, from view its mechanical charging device is an incomplete arrangement; and it is possible that the continuous charging, but periodical discharging, of the retorts will not agree very well, since the evolution of gas must proceed under constantly changing conditions according to the operations of the periodical removal of coke from and steady feeding of coal into the retorts. In consequence thereof uniformity in the quality of gas is not to be expected. About the Woodall-Duckham system the same may be said, as far as the charging of the retorts goes. Whether or not the coke removing machinery now used is satisfactory I cannot say, having no further information upon that subject. At any rate a good, practical solution of the first of these problems seems much easier than the second. The gas production results with this system may agree closely with those of the Dessau retort style, bcause the conditions governing production of gas are surely not less favorable in the former than with the latter. The Dessau retort still retains the periodical, heavy charging and full discharge of the retorts, while with the Woodall-Duckham that at least is as good as constant. The quenching of the coke before discharging it out of the retorts includes the introduction of some steam, and consequently favors operations in the Woodall-Duckham system by a greater ammonia production.

The Dessau vertical retort system has been more extensively introduced and demonstrated in practice to date than any other vertical retort system, has given such uniform satisfaction and presented such well authenticated results that it has been adopted even now in quite a number of gas works, which have changed over from the former manufacturing process to the Dessau type. One advantage is the straight, open at the bottom-and-top retorts, which can be easily inspected and their condition controlled.

The vertical retorts of Herring and of Young and Glover are still only very promising propositions and are awaiting their introduction and trial in actual practice, but on the whole I view in them a worthy-to-be attained type of retort bench—a type of the future with continuous production of uniform gas and elimination of dust and vapor, and an increased production of ammonia, by means of the water vapor derived from quenching the coke in the setting.

Retorts, which in this manner also produce water gas as an additional product, have been adversely commented upon because it was said that by so doing the remaining coke would deteriorate in value or become worthless, as a part of the carbon would be taken away in the form of CO while the whole of the ash would remain. In other words, as the coke would be richer in ash it would be less valuable.

I hold this theory is not well grounded according to my calculations. To quench 220.4 pounds of coke only 4.4 pounds of steam are required, and less than 2.2 pounds of carbon are oxidized. And it may safely be assumed that, by the present method of drawing the coke and allowing the whole charge to glow and burn in the air before quenching, the loss is at the least just as great. Then the opponents of the vertical retorts have denied altogether that the system was possessed of any advantages whatever and have even denied their ability to exist. It was accurately figured out by some that the vertical retorts would become soft as rubber in the heat of the fire, and that they would fall apart without fail, from the pressure of the coal within; but as these retorts are still holding together all right these adverse calculations notwithstanding, the whole oven construction appeals to an unprejudiced observer that it naturally must last and, in fact, stand up better than any horizontal or inclined retort can. An additional remarkable fact is that the gases in passing through the layers of coal in a vertical retort are apparently less easily dissociated than in the large coke chamber ovens, which, although working under similar conditions, only produce a poorer quality of illuminating gas, which is explained by the fact that in vertical retorts the gases do not ascend in contact with the incandescent retort walls *but within the inside of the coke and coke cake.* I must confess that this explanation satisfies me entirely. Summing up the results with vertical retorts as hitherto known, the following facts appear to me firmly established:

1. The production of gas in vertical retorts *is* possible and is more advantageous than the process with horizontal or inclined retorts.

2. The durability of the retorts, the reliability in operation, the materially lightening the heavy labor, and the better gasifying results have been (especially with the Dessau retort system) demonstrated as unobjectionable and thoroughly practical.

3. To convert the nitrogen in the coal into the more valuable ammonia, steam must be admitted into the gassing retort; and to obtain a maximum yield of ammonia the watery vapor admitted to the inside of the retort must be augmented when the working heat is increased.

4. A large admission of steam, while it increases the volume of gas produced, will also reduce its calorific value, which should not be allowed to go below 5,000 calories, and under certain conditions the value of the coke is reduced.

5. By using only enough steam to quench the coke in the retort the quality of the coke is scarcely affected.

Following these determinations of facts there open to us vistas of the future of a better, more economical, simpler, rational, less difficult or exhausting method of gas manufacture, which as it is at present is not at all reposing upon such an exalted elevation as that it can be regarded with pride in this progressive, technical age.

As the nearest to the ideal, let the Dessau retort system be welcome! May the advancing future present us with, the more perfect, continuous production of gas, the most durable of ovens, the heightened results in production of gas, the most sparing and forbearing requiremeuts on our labor forces, the elimination of all smoke, vapor, and excessive heat annoyances. Neither the horizontal retorts, which have as it were but now received a material strengthening of their imperiled, hard-pressed position, nor yet the inclined retort, with its difficult building conditions, and which with all its promised automatic discharging did not quite come up to all they had at first promised; neither the large nor great chamber ovens, with their greater time requirements for proper carbonization of charges, with their harder coke but less gas, will be the process of the future. And if all signs fail not, then the ideal, smoke and vapor-freed, continuously gas producing vertical retort will be the base of the long desired gas process of the future,

Denatured Alcohol as Probable Fire Risk Reducer and Health Promoter.

The *American Exchange and Review*, in respect of the topics above named, remarks that natural alcohol is composed of 54 per cent. of carbon, 35 per cent. of oxygen and 13 per cent. of hydrogen, and a modification of the composition called denatured alcohol for employment in industrial production is proposed with carbon as the heater, hydrogen as the flamer and oxygen as the supporter of the combustion. State Fire Marshal D. S. Creamer, of Ohio, has issued a circular giving his views of the relations of the subject to the fire hazard and personal health, in which he says:

In what has been printed, fairy stories and all, in regard to the advent of the industrial millennium from the use of denatured alcohol, no word is said of the effect of its introduction upon the fire loss or death rate of the country, although it will reduce both. The greatest reduction of the fire loss from the use of denatured alcohol, or "industrial" alcohol as it is now named by the agricultural department, will be through its displacing coal and wood in the heating of living rooms.

The value of property destroyed in Ohio last year by sparks escaping from cracks in chimneys and open joints in stovepipes was $377,712. Sparks from chimney mouths falling upon roofs or rubbish cost $74,117. Fires from open grates igniting stuff in the room cost $271,856. The combustion of gasified alcohol is so nearly perfect that it produces no sparks, so these amounts will be saved from the ash heap yearly.

Chimney soot burning started fires which cost $10,458. The carbon of alcohol is completely converted into heat, water and carbonic acid. That the combustion is perfect is shown in the fact that its blaze is not made yellow by escaping atoms of carbon in the form of charcoal being made incandescent, as is seen in the combustion of wood or coal. The particles of carbon which furnish light in the flame from wood or coal lodge in the chimney and constitute soot. This soot may become ignited by sparks, or any considerable mass of it, if damp, may ignite from internal heat; *i. e.*, from spontaneous combustion. An alcohol flame is sootless. So, no soot from it can gather in a flue to become ignited.

Hot ashes in boxes and barrels, on floors or against buildings or fences, burned $80,693 worth of buildings. Alcohol leaves no ash to carry out. Hot coals falling from defective stoves and open grates cost $105,211. There is no coal stage in the combustion of alcohol. Gasoline stove explosions started fires which burned up $56,469 worth. The foregoing buildings while burning fired nearby buildings which burned at a cost of $94,772. These sums added show the destruction of wealth by accidents in coal and wood heaters to be $1,071,278 a year.

If the loss on automobiles from gasoline explosions be added, and it surely should be, for at double the price it will be used instead of gasoline for automobiles, the lessening of the annual sacrifice to Moloch will considerably exceed $1,000,000.

In the interest of health, alcohol for warming rooms is preferable to coal or wood, because no carbon monoxide is formed by its burning. Where there is plenty of air for combustion each carbon atom attaches itself to two atoms of oxygen from the air, forming carbon dioxide, which is carbonic acid gas, the gas used in soda fountains. It destroys life only when it is breathed instead of air—as in the "after damp," following the explosion, which suffocates miners. From our chimneys it goes to furnish food for plants.

If the supply of air is not ample 1 atom of carbon joins 1 atom of oxygen, forming carbon monoxide, which is an exceedingly poisonous gas. In small quantities it kills by poisoning the red blood corpuscles, and it is an element in the so-called smoke explosions. The alcohol stove produces none of it unless heated red hot.

Another advantage of alcohol stoves over those burning wood or coal is that, the stoves being open, much of the water produced in burning it escapes into the room in the form of vapor. This vapor increases one's feeling of warmth, so that the actual temperature of the room does not need to be kept so high. Will free alcohol be cheap enough to displace coal, wood and gasoline for heaters?

With the foregoing applying to the use of the changed alcohol, the Boston Board of Fire Underwriters adopts the following specific charge as to the storage of the liquid which has no deficient combustion:

Where denaturized alcohol is kept in storage a charge of 25 cents must be made to the rate of the building and contents.

That is, with insurance $10,000, the denatured alcohol costs $2.50 in such case.

Paints for Roofs.

The *Metal Worker* says that a new hand who is sent out to paint a new tin roof is not apt to appreciate the importance of the work he has in hand, neither is he apt to be as fully equipped for the work as old hands who have been set to a similar task frequently. Whether it is a flat seam roof or a standing seam roof there are sure to be some places where soldering has been done. If the weather is good the older hand will immediately hunt the soldered places and scrape off all the rosin that is along the seam or around the solder. If he is very careful he may have an old dust brush and a sheet of tin to take up this rosin and throw it over the eave, so that it can in no way become mixed with the paint to do any harm. After he has been careful with the

scraping work, if the roof has laid a few days, he may have provided himself with a broom and will sweep all the dust off of the tin, so as allow the paint to come in direct contact with the surface to be protected, with no foreign matter to interfere.

Selecting and Mixing the Paint.—While the workman may have little to do with the character of the paint he is to apply he will have a great deal to do with the mixing of it and keeping it in the proper consistency while the work is being done. A great deal has been said about the kind of paint that is best adapted for painting tin roofs. Fortunately, for the avoidance of any monopoly, there are several kinds of paint which are very good. Venetian red and the metallic browns of the best grades are equally good. Unfortunately there are many metallic browns on the market and some have very little to recommend them; but whichever body is used, if it is ground in oil and mixed with good oil and then properly applied it will stand the ravages of time without a great deal of detriment. Many roofers may not be well qualified to discriminate in the selection of their paint, and under such circumstances they may safely rely on the paints which bring a cent or two more per pound before mixing as being better than those which sell at a lower figure and have little but the price to recommend them. The same may be said of oil. A good oil is rather expensive, but in experience the covering qualities are greater, and the difference in cost is not so great as the difference in the covering quality of the materials.

The Use of a Dryer.—If it was possible to have good weather until the paint dried firmly the addition of some material to facilitate the drying would be neither necessary nor advantageous. Owing to the uncertainty of the weather, however, and from the fact that a small proportion of a good dryer is not detrimental, most men who provide paint for roofs will mix in a small proportion of something which will quicken the drying or hardening process. It is when improper materials are used in excessive quantities to the exclusion of good oil or form too great a proportion of the mixture that there is a positive objection to their use. When the workman has been furnished with the right kind of raw materials and appreciates the necessity of stirring the paint occasionally to prevent settling in the bottom and to keep the mixture of the same consistency he is ready for the tools to apply the paint.

The Brushes.—If the roof is flat enough, so that he can walk around on it with safety, men differ as to whether a hand brush should be used or whether a broader brush may be used on the end of a pole with good results. Some incline to the opinion that the brush on a pole cannot be made to do as good work in rubbing the paint in well and at the same time out so as to cover a large surface as when a hand brush is used. Certainly the workman with a wide brush on a pole can cover more ground with less labor and without tiring himself out as he would in the use of a hand brush. Old roofers who enjoy an excellent reputation for good work and the long service of roofs do not require their men to use the hand brush, but are particular to see that the tool equipment is kept in good order. It is quite probable that some of the cheapest tin plates used by these experienced and careful men have rendered quite as good service as when high grade plates have been used by other men who have not appreciated the destructive effect of some kinds of painting material.

Destructive Paints.—Some of the black paints contain a considerable amount of sulphur, and where a tin plate has a comparatively light coating the importance of the paint question will be more readily understood when roofers generally are aware of the fact that manufacturers have been devoting considerable attention to the careful study of the effect which different paints freely advertised have when applied to tin roofs. Their observations are corroborated by the experience of old and successful roofers. The conclusions are that some paints will aid in the quick destruction of plates that are heavily coated with tin, no matter what their base may be. These investigations have been going on quietly for a long time, with the certainty that some who have complained of the durability of the tin roof are more responsible than they know for the early destruction of some of their work. With these facts before them for refutation or verification it remains for the conscientious roofer to discover whether or not the painting materials he is using are likely to cause trouble to his customer, and a complaint for which he is entirely responsible.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

At the annual meeting of the Natural Gas, Electric Light and Power Company, of Detroit, Mich., the following Directors were elected, to to serve 3 years—of the central body three Directors are chosen each year, the Board consisting of 15 members: A. D. Bennett, John D. McMahon and Ellwood T. Hance.

The Common Council of Newark, N. J., is proposing to establish a bureau for the inspection and testing of electric current meters.

The Denver (Col.) Gas and Electric Company will construct a suitable office building this year on the plot recently purchased by it, the local cognomen of which is the Bates' Triangle. It is most eligibly situated.

Advices from Boston, Mass., are to the effect that, "If he cannot legally have the right to practice law, so far as it may not interfere directly or indirectly with his official duties, Mr. Alonzo Weed will resign his place as a member of the Massachusetts Board of Gas and Electric Light Commissioners." Under the circumstances one can hardly be criticized for remarking that it might be as well to permit him to occupy the field wherein his growth to maturity would seem best suited.

At the annual meeting of the Rome (N. Y.) Gas, Electric Light and Power Company the officers chosen were: Directors, E. Seager, M. B. Daly, John D. McMahon, Thos. Striker, F. K. Pelton, Jas. T. Lynn and R. A. Fields. President, Jas. T. Lynn; Vice-President, M. B. Daly; Treasurer and Secretary, F. K. Pelton.

A correspondent in Tacoma, Wash., writing under date of the 24th ult., says: "Dear Journal: You may as well have it right. The increase in the business of the Tacoma Gas Light Company for the year was 40 per cent., not 15 per cent., as stated recently in your items of interest. Since Mr. Aldrich took charge last August the rate of increase is somewhat over 60 per cent. Good is Aldrich; great is Tacoma. Watch us grow!"

Superintendent Sloane, of the Calumet (Mich.) Gas Company, says that gas will surely be turned on by April 15th. "It's been a pretty hard winter out Calumet way."

Mr. H. M. Terry succeeds to the vacancy on the staff of the Westchester Lighting Company, Yonkers (N. Y.) division, occasioned by the promotion of Mr. Raymond M. Kellogg to the post of Superintendent of the Lowell (Mass.) Company.

So far as we have heard the highest bid offered to Mr. John McSweeney, Receiver of the Wooster (O.) Gas Light Company, for the properties thereof, submitted by Dr. J. M. Bush, of Pittsburgh, Pa., is $7,000.

It is reported that R. S Lowe & Co., of San Francisco, Cal., have agreed to construct a gas plant in the city of Parral, Mexico.

Representative McBride, of the Sangamon county, Ills., district, has introduced two bills in the Legislature of that State, which are practically of this nature:

No. 491.—Fixing the price of gas in cities outside of Chicago at 85 cents, and in Chicago at 75 cents, and fixing a standard of quality at 16-candle power. Also, giving companies the right of appeal to the courts when the price is considered unreasonable.

No. 489.—Providing for State inspection of gas and gas meters. Under this it is proposed to appoint a State inspector and 2 assistants, the same to hold office for 3 years, to be paid salaries, respectively, of $2,500, $1,500 and $1,200. Both measures were referred to the Committee on Municipal Corporations.

The Brooklyn (N.Y.) League recently appointed a special committee on gas, charged with the duty of investigating complaints respecting the gas supply that were brought to its notice. The initial report submitted by the committee, is as follows:

"Your Committee endeavored to secure a sufficient number of definite complaints as regards the quality of gas furnished by the Brooklyn Union Gas Company in order to have a substantial foundation of complaints before calling upon the officers of the Gas Company. They sent to every member of the executive committee of the League, inclosing a stamped envelope, asking for complaints. Only 12 replies, and 1 envelope without inclosure, were received to the 35 letters sent out. Of these 12, two lived in Flatbush, two used electricity and two had no complaints to make, reducing the actual number of complaints to six. In addition to sending these letters, your Committee inquired extensively among their acquaintances and asked for complaints from a number of large buildings. Most of the large buildings—such as theaters, hotels, etc., use electricity. The agents of two large tenement houses gave directly contradictory reports about the gas, one claiming it was sooty and the other that it was not. The proprietor of one rather large hotel in lower Fulton street that does use gas stated he had no complaint to make. In view of the small number of complaints, your Committee hardly felt justified in calling on the Gas Company; but General Jourdan having in some way received notice that a Commit-

tee had been appointed by the Brooklyn League, anticipated any action on our part by writing to us inviting us to visit the works and make every examination and test that we desired to. The invitation was also extended to all members of the executive committee of the League. On the 19th February your Committee, with a number of other members, visited the works at Fifth street and Gowanus canal. The Committee secured the services of Professor William Hallock, of Columbia University, probably as well qualified as anyone in the United States to pass on such matters. A careful examination was made of the works and the method of making and supplying the gas, and access was had to the Company's personal records, showing pressure at the works and the result of their daily tests of the quality of the gas. It may not be generally understood that the Gas Company only undertakes to deliver the gas to the consumer's house, and the consumer must furnish and care for his own pipes, gas tips, etc. The contention of the Company is that it does furnish good gas up to the meter, and that the complaints that are made of poor quality, poor pressure, etc., are due to imperfections in the pipes and tips inside the houses—over which the Gas Company has no control. This contention in the judgment of your Committee is well founded by their investigation. Your Committee beg leave to report that, as far as their investigation has gone, they consider the quality of the gas furnished by the Brooklyn Union Gas Company as fully up to the standard required by law; that the methods of manufacturing the gas are modern and up-to-date, and that the complaints made as to the poor quality, pressure, etc., are largely due to defects in the pipes of the consumers, traceable to their neglect or indifference."

THE League Committee that conducted the above examination comprised Messrs. Isaac H. Cary and Guy du Val, two gentlemen known through the Brooklyn district as men keen in business, reputable as citizens, and absolutely reliable. President Jourdan is to be congratulated on the cleverness of the stand taken by him in respect to the merits of their examination. In no sense did he thwart; in every sense he expedited it.

A SPECIAL line or two from Washington, D. C., conveys the information that there is no particular trouble there existing between the American Lamplighting Company and its employees. The lamplighter in chief, or the District of Columbia official who has charge of all the public lighting thereof (Mr. Thomas J. Fisher) says that Mr. Thomas M. Quill, the General Manager of the American Lighting Company, is quite able to take care of any contention that may arise amongst his employees.

MR. ROGER W. POLK, writing under date of the 4th inst., informs us that the Laclede Firebrick Manufacturing Company has on its books the following contracts, entered into since January 1st: Twenty benches eights for Detroit, Mich.; 3 benches of sixes, Laclede Gas Light Company, St. Louis; 1 bench for Marshall, Mo.; 7 benches, Racine, Wis.; 1 bench, Paris, Ills.; 2 benches, Centralia, Ills.; 5 benches, Taunton, Mass.; and lining complete for water gas apparatus at Dallas, Tex.; Stoughton, Wis.; Port Washington, Wis., and Sioux Falls, So. Dak.

THE Bowen & Co., of Philadelphia, naturally, is anxious to secure the contract for the rehabilitation of the Richmond, Va., municipal gas works. The Richmond *Leader* of the 27th ult., in referring to this matter had this to say about Mr. W. S. Bowen, the engineer of the firm in question: "He is widely known as an expert engineer of gas works construction, and is the inventor of a *soft coal gas* now in use in many cities."

"R. T. W.," writing to the JOURNAL under date of March 2, says: "The United Gas Company, which recently began to supply natural gas to the residents of Wichita, obtained a monopoly of the lighting business in Wichita through the purchase last week of the Wichita Gas Company and the Wichita Electric Light and Power Company. President Davidson, of the purchasing corporation, avers that the named Companies will be operated as separate concerns."

MR. C. H. GEIST has been granted a franchise for the construction and operation of a gas plant in Plymouth, Ind. He declares that the works will be completed and in operation by September 1st.

MR. F. A. KIDDER, Superintendent of the Red Oak (Ia.) Gas Light Company, is in the market for a storage holder up to retaining 25,000 cubic feet. The vessel is to rest in a steel tank.

WE regret to report the death of Mr. Nicholas Ludlam Petit, who for many years was in charge of the accounting room of the old Brooklyn (N. Y.) Gas Company. He will no doubt be affectionately remembered by many of the old guard who were potent in Brooklyn gas matters in the palmy days of the Benson-Morgan-Thomas regime. Mr. Petit was in his 86th year (he was out of active business for 20 years or more), and the funeral services was held in the house of his son, Theodore, 163 Washington Park, Brooklyn, the evening of the 24th ult.

THE proprietors of the Marlboro-Hudson (Mass.) Gas Light Company have arranged for an extension of the Company's main system to the outlying districts of Maynard and Snow.

AT the annual meeting of the Stamford (Conn.) Gas and Electric Company the Directors then chosen named the following executive management: President, Walton Ferguson; Vice-President, Samuel Fessenden; Treasurer, Alfred W. Dater; Assistant Treasurer, Chas. H. Lounsbury; Secretary, Charles H. Lounsbury; Superintendent, George B. Leland.

THAT Rhode Island specimen of ability and astuteness, Mr. Frank E. Holden, President of the Woonsocket (R. I.) Gas Company, has accomplished that which he set out to perform—the complete unification of the gas and electric lighting interests of Woonsocket—it was a complicated task, too.

THE owners of the Bristol County (R. I.) Gas and Electric Company have instituted a flat selling rate on all accounts of $1.60 per 1,000 cubic feet.

WE are indebted to the courtesy of Mr. William H. Snow, the capable and conscientious Manager of the Gas and Electric Department of the city of Holyoke, Mass., for a copy of his report to the city authorities of that place respecting his management of that Department for the year 1906. Manager Snow reports: "There has been a satisfactory increase in the volume of business done from the two lighting plants during the past year, the gain from the gas works being 8.30 per cent., and that from the electric station being 35.6 per cent. Since making the last report, the new gasholder at the foot of Mosher street has been completed and put into use, giving the gas works ample storage capacity for its manufactured gas for years to come. Of other apparatus added to the equipment of the works, only one exhauster with its accompanying motor was put in. * * * There have been laid 2.05 miles of gas mains of various sizes together with 195 gas service pipes. There have been set 819 gas meters, making a gain in the number of gas consumers of 13.6 per cent. There needs to be installed during the coming year at the works a duplicate set of water gas apparatus in order to make sure that the works can always make gas enough to supply the demand. In addition to this, the purifiers need enlarging, as shown by the State Inspector finding more sulphur in the gas than the law allows on 3 successive inspections. The electric station is fast being gotten into shape to comfortably handle the constantly increasing business that is crowding upon it. During the year, there has been installed one 1,000-k.w. turbo-generator. Three new boilers have been contracted for. Upon their installation, the station will have a rated steam capacity in its 2 steam turbines and its two reciprocating engines of 3,000-horse power, and a possible maximum capacity of 4,000-horse power. This is in addition to the 1,000-horse power in water power; but practically is the rated capacity of the station, owing to the fact of there not being an unfailing supply of water power attached to it. The greatest demand upon the station the past year has been about 2,100-horse power. There have been added to the street lines 21 miles of wire, 41 transformers have been set, and 237 meters have been added. There has been a gain of 193 in the number of customers using electricity, or 37 per cent. increase. Owing to the good financial showing of the electric station, it is found practicable to reduce the price of street arc lights from $80 to $60 per light per year, making a reduction in the amount the street department pays this department for street lights of over $10,000 per year. It has been the custom of this department to furnish the first installation of incandescent lamps and to charge for renewals. Commencing as soon after January 1, 1907, as the lamps can be procured, it will also furnish free renewals. In addition, it proposes to furnish lamps of a different rating. In place of a 16-candle power lamp using 56 watts per hour, it will furnish one that uses 50 watts per hour, and it expects, by the 1st of May, to be able to furnish an 18-candle power lamp, using only 45 watts per hour.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
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NOTIFICATION RESPECTING ADVERTISING.

Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, MARCH 11, 1907.

The Market for Gas Securities.

There is no market for Consolidated in common with the lack of a market for anything else in a financial way at the time of writing—Friday noon. The quotation at this hour is 127¼ to 127½. If it is not worth 175 it is not worth anything. The least said now the best. Brooklyn Union held its own better than anything else on the list. But why should it not? It has been selling at 50 points under its fair worth for a half year.

Peoples, of Chicago, is 91 bid, and it has held fairly steady. The Massachusetts Gas Companies have declared a dividend of 1 per cent. on the common, payable the 1st prox. The Safety Car Heating and Lighting Company has declared a regular dividend of 2 per cent. and an extra of like amount, payable April 1. It looks like the time to buy.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

MARCH 11.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	127⅜	127¾
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	101	104
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	..	105
Mutual	3,500,000	100	190	225
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	98¼	100
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p.ct.	1,000,000	..	98	104
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	101	103
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	108	111
Con. 5's, due 1945, J. & J.	1,500,000	..	104	110
Standard	5,000,000	100	140	160
Preferred	5,000,000	100	155	175
1st Mtg. 5's, due 1930, M. & N	1,500,000	1,000	104	108
The Brooklyn Union	15,000,000	1,000	115	125
1st Con. 5's, due 1948, M. & N	15,000,000		107	..
Yonkers	299,650	500	130	..
Out-of-Town Companies.				
Bay State	50,000,000	50	¼	⅝
" Income Bonds	2,000,000	1,000	..	75
Binghamton Gas Works	450,000	100	..	65
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47¼	50
Buffalo City Gas Co.	5,500,000	100	9	10
" " Bonds, 5's	5,230,000	1,000	75	80
Capital, Sacramento	500,000	50	..	85
Bonds (6's)	150,000	1,000	..	..
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	106¾
Cincinnati Gas and Electric Co.	29,500,000	100	99¾	100
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	90	..
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	..	95
Preferred	3,026,500	100	107½	108
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	.	90
Mortgage, 6's	3,500,000	..	..	118
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	..	..	100
Detroit City Gas Co	5,000,000	50	..	50
" Prior Lien 5's	4,618,000	1,000	..	98
Detroit Gas Co., 5's	381,000	1,000	75	80
" Inc. 5's	16,000	100	98½	100
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	39	40
Fort Wayne	2,000,000	..	..	..
" Bonds	2,000,000	..	55	..
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	..	110	112
Bonds, 5's	10,500,000	..	107½	108½
Indianapolis	2,000,000	..	60	70
" Bonds, 5's	2,650,000	..	104½	105
Jackson Gas Co	250,000	50	82	..
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	..	05
Preferred	2,500,000	100	95	110
Bonds	10,000,000	1,000	104	104¼
Lafayette Gas Co., Ind.	1,000,000	100	..	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas & Elec. Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	85	87
Massachusetts Gas Companies of Boston	25,000,000	100	62	62½
Preferred	25,000,000	100	84½	85
Montreal, Canada	2,000,000	100	218	218¾
Nashville Gas Lt. Co.	1,000,000	100	110	.
Newark, N. J., Con. Gas Co.	6,000,000	..	56	58
Bonds, 6's	6,000,000	..	137	138
New Haven	2,000,000	25	200	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	90½	90⅝
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
" 2d "	2,500,000	1,000	104	..
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	104½	105½
San Francisco, Cal.	15,800,000	100	..	..
St. Joseph Gas Co. 1st Mtg. 5's	751,000	1,000	92	..
St. Paul Gas Light Co	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	2,465,000	1,000	96¼	..
Syracuse, N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	102	..
Washington, D. C	2,600,000	20	281⅞	285
First mortgage 6's	600,000	..	..	..
Western, Milwaukee	4,000,000	..	..	..
Wilmington, Del.	600.000	50	230	..

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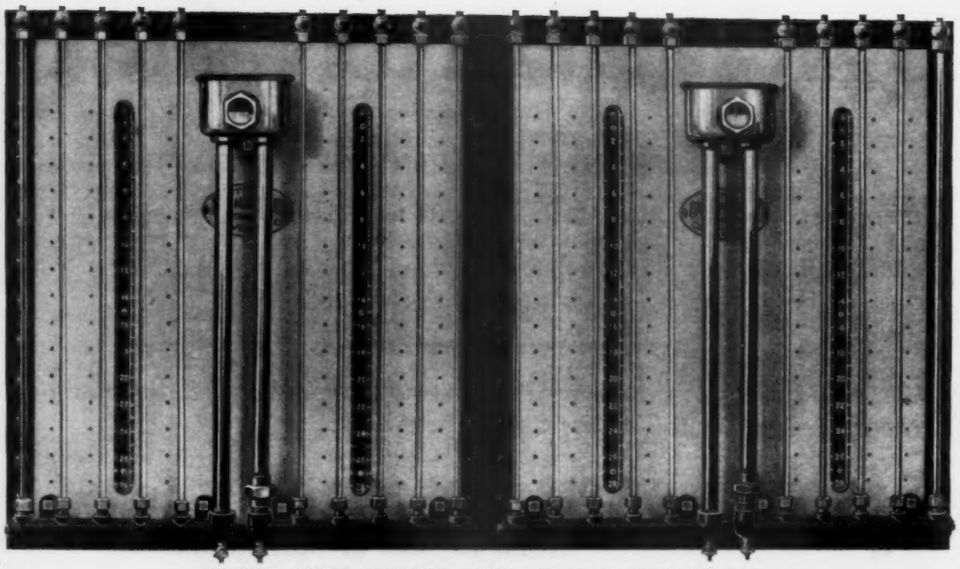

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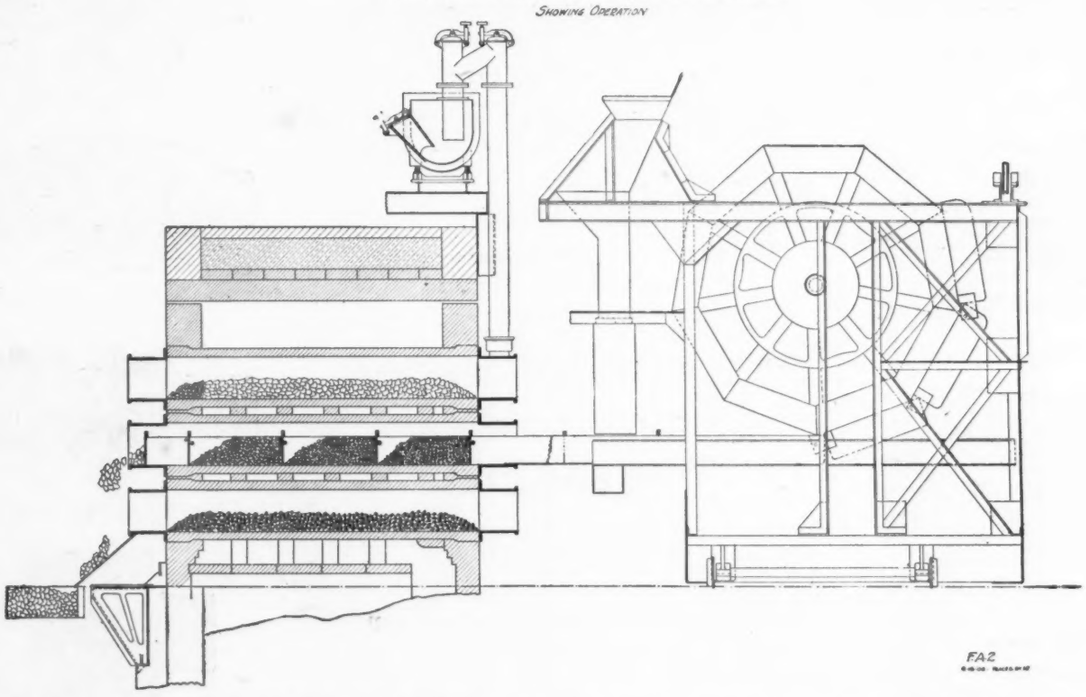

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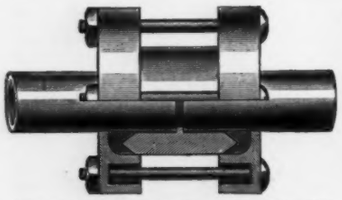
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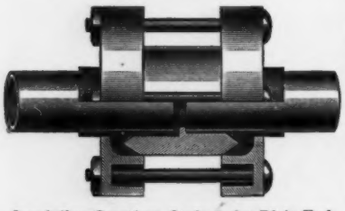
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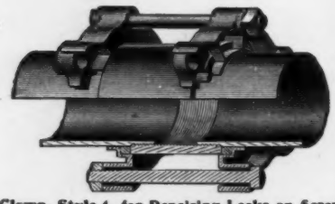
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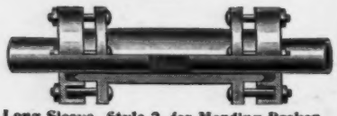
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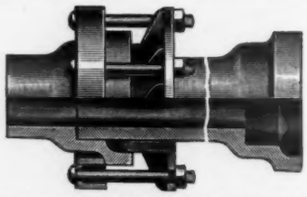
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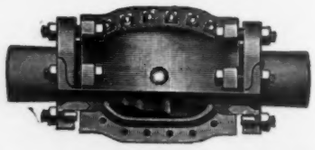
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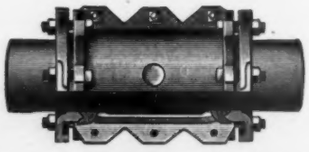
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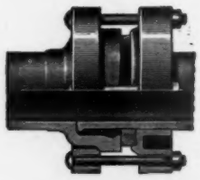
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UNCONDITIONAL GUARANTEE

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FOR THE

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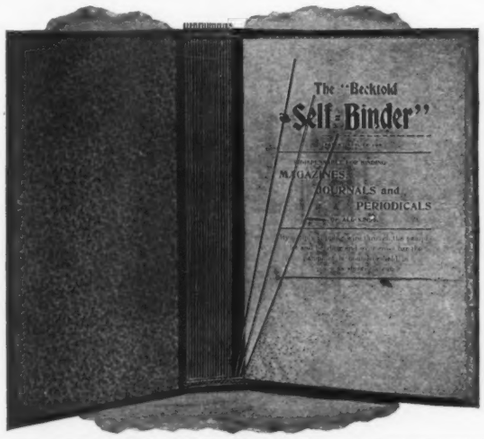

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FOR SALE BY

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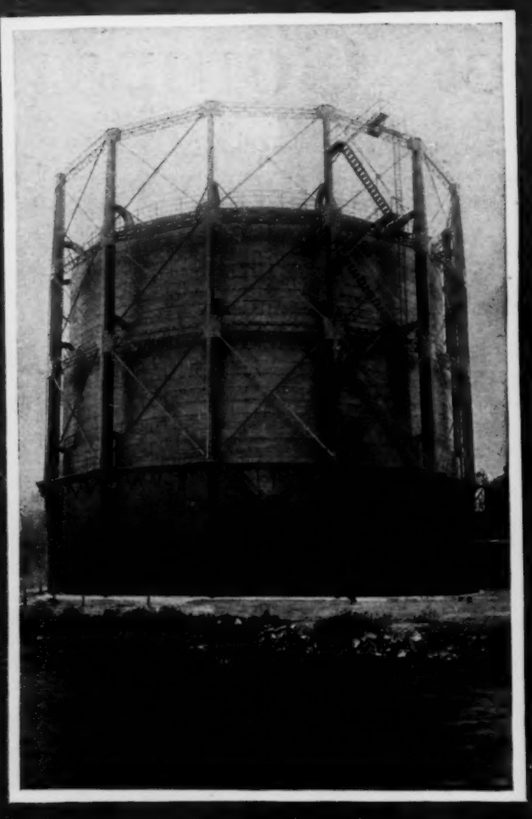

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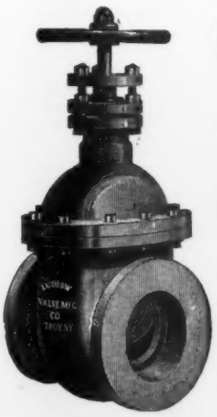

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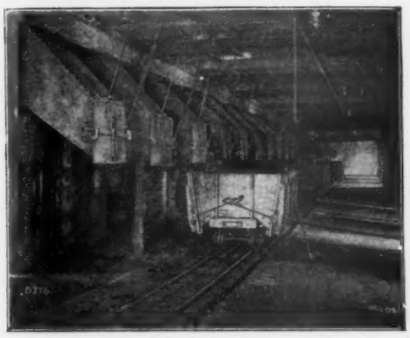

This cut shows the Hunt Cable Car handling coke (cold) which has been quenched in the Mann chute.

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Necessary Equipment

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For Every Gas Plant.

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High Grade Firebrick, Blocks, Tiles,

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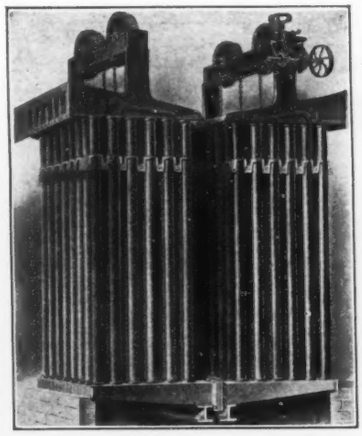

HOW MUCH COAL PER 1,000 CU. FT. OF WATER GAS?

If the process of making water gas were theoretically perfect, only 24 lbs. of coal would be consumed per 1,000 cu. ft. of gas generated. As a matter of fact, the actual figures are between 40 and 48 lbs. per 1,000 cu. ft. It is apparent that there is a waste somewhere, and if you will take the trouble to put a thermometer over the stack valve during the "blowing up" period, you will see where the heat goes to. From one-third to one-half of the heat escapes to the atmosphere, either as sensible heat or latent heat of combustion. If use can be found for this heat a great economy could be effected immediately.

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MATTEAWAN, N. Y.
(Sole builders of the Green Fuel Economizer in this country; we also build Fans and Blowers.)

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HUMPHREY CRESCENT INSTANTANEOUS WATER HEATERS.

Efficient. Compact. Durable. Every Heater Guaranteed.

No. Heaters.	Price.	Gas Supply from Meter.	Heats Gals. per Min. 50° in Temperature.	Height.	Diameter.	Shipping Weight.
Non-Contact.. 2	$40.00	¾ Inch.	2¼	34⅝ Inches.	12 Inches.	70 Pounds.
Contact..... 6	29.00	¾ "	3	29½ "	12 "	60 "
" 8	23.50	1 "	2¼	28½ "	10¼ "	48 "

These prices include Safety Valves and Unions, one Bent Output Spout. For prices of fittings see our complete catalogue, "The Luxury of a Bath."

We will be glad to quote Discounts.

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Complete Safety.

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WHY DO GAS EXHAUSTERS

AND HIGH PRESSURE GAS PUMPS BUILT BY

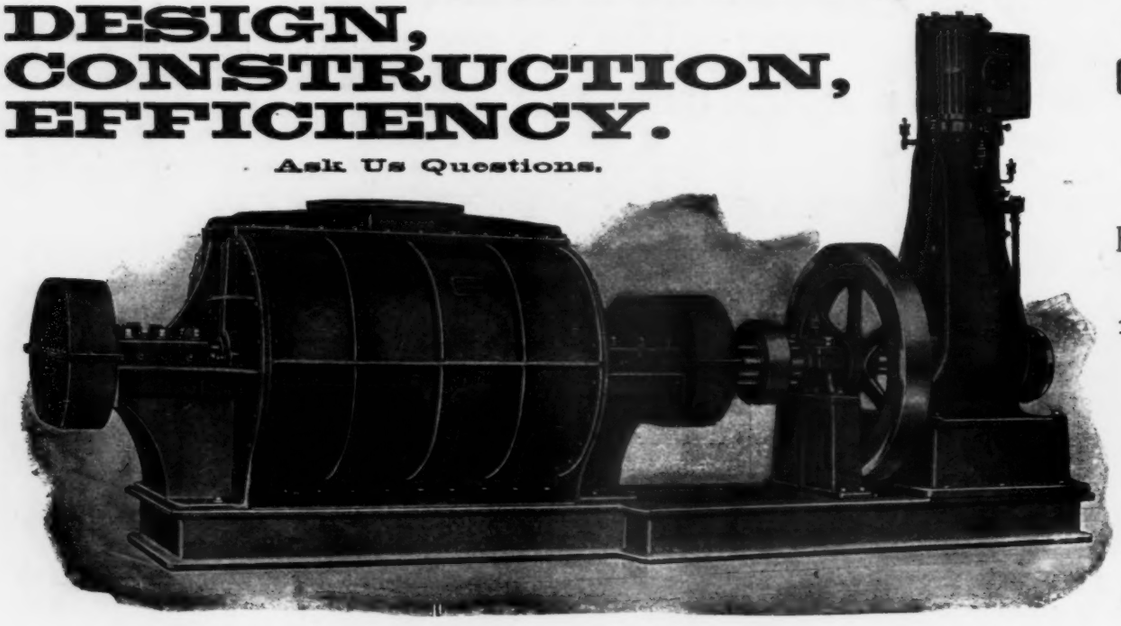
THE CONNERSVILLE BLOWER CO.

Stand so High in the estimation of those using them?

THE ANSWER IS IN THREE WORDS:

DESIGN, CONSTRUCTION, EFFICIENCY.

Ask Us Questions.



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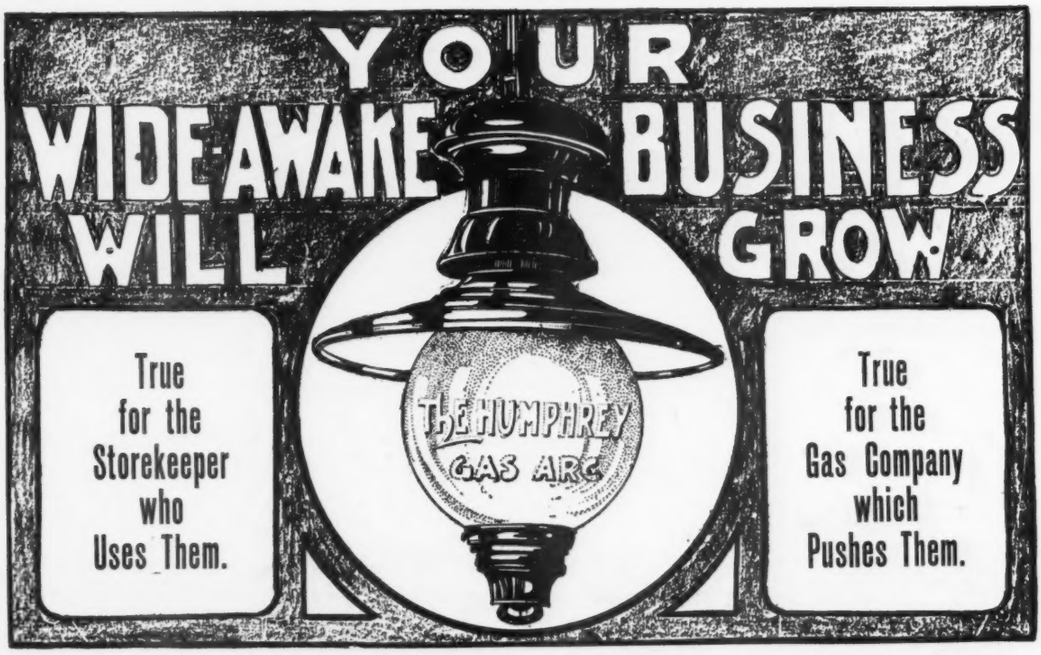
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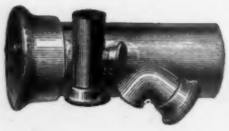

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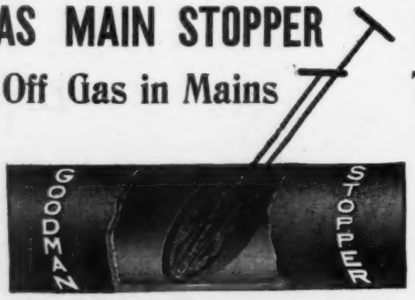
SAFETY GAS MAIN STOPPER COMPANY,

For Shutting Off Gas in Mains Temporarily during alterations and repairs. : : : :

Any size gas main can be shut off in 30 seconds. : : :



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Chollar's System of Gas Purification.

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what size of pipe to use to convey any quantity of gas, any distance, with any loss of pressure and any initial or final pressure? Then use

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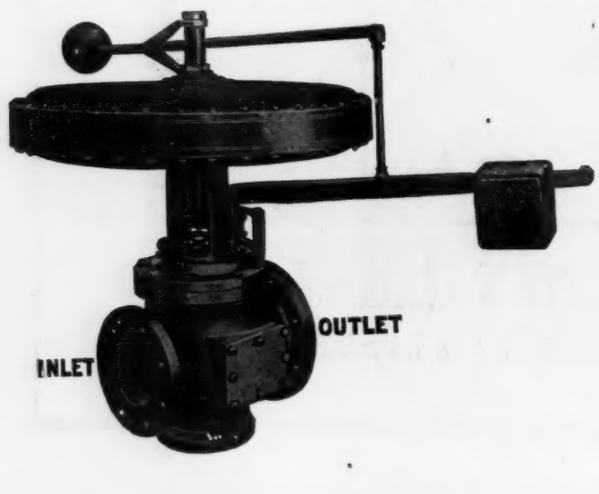

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

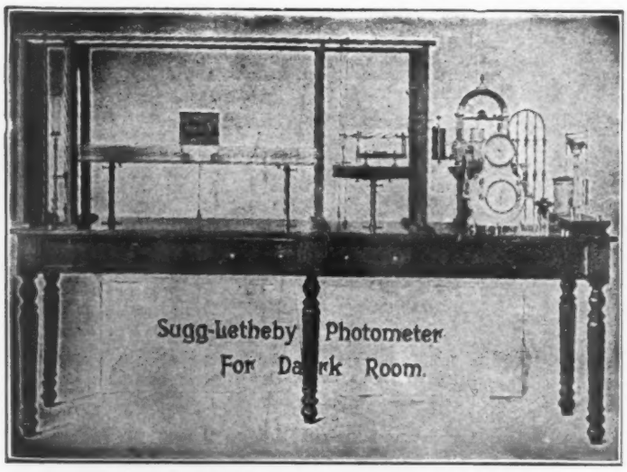
MARCH, 1907.

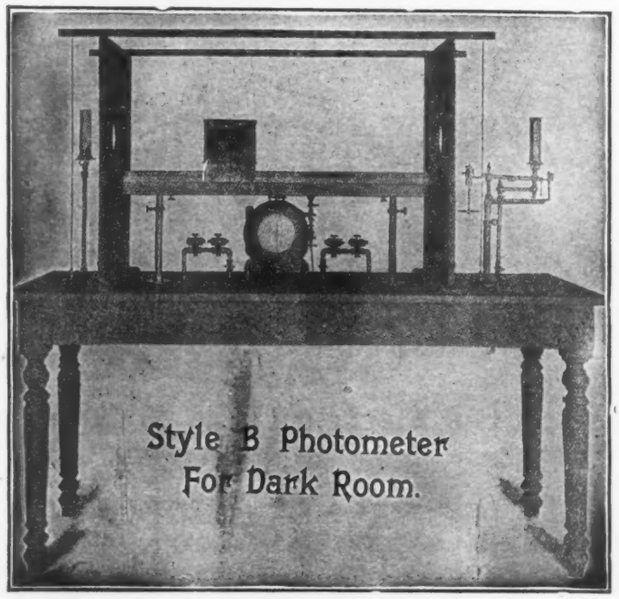
Day of Week.	Table No. 1. Following the Moon. Date.	Light.	Extinguish.
Fri.	1	6.20 PM	8.30 PM
Sat.	2	6.20	9.30
Sun.	3	6.30	10.40
Mon.	4	6.30	11.50
Tue.	5	6.30	12.50 AM
Wed.	6	6.30 LQ	2.00
Thu.	7	6.30	3.10
Fri.	8	6.30	4.10
Sat.	9	6.30	5.10
Sun.	10	6.30	5.20
Mon.	11	6.30	5.20
Tue.	12	6.30	5.20
Wed.	13	6.30 NM	5.20
Thu.	14	6.30	5.20
Fri.	15	6.30	5.20
Sat.	16	6.30	5.20
Sun.	17	6.40	5.10
Mon.	18	9.50	5.10
Tue.	19	10.40	5.10
Wed.	20	11.40	5.10
Thu.	21	12.30 AM FQ	5.10
Fri.	22	1.20	5.10
Sat.	23	2.10	5.10
Sun.	24	2.50	4.50
Mon.	25	3.30	4.50
Tue.	26	4.00	4.50
Wed.	27	4.30	4.50
Thu.	28	No L.	No L.
Fri.	29	No L FM	No L.
Sat.	30	No L.	No L.
Sun.	31	6.50 PM	9.40 PM

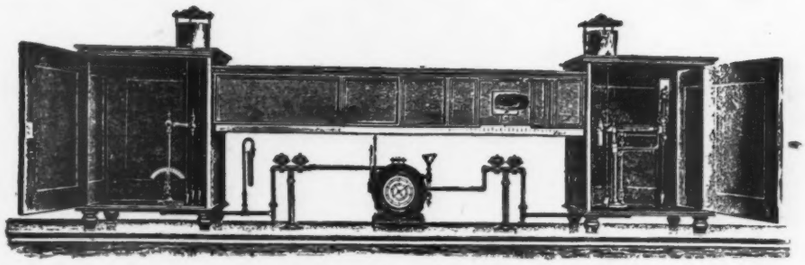
TOTAL HOURS DURING 1907.

By Table No. 1.

	Hrs. Min.
January	211.10
February	193.40
March	182.10
April	167.00
May	157.00
June	145.30
July	151.50
August	162.30
September	175.30
October	202.40
November	209.30
December	231.50
Total, yr.	2190.20







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

MARCH, 1907.

Day of Week.	Table No. 2. New York City. All Night Lighting. Date.	Light.	Extinguish.
		P. M.	A. M.
Fri.	1	5.30	5.45
Sat.	2	5.30	5.45
Sun.	3	5.30	5.45
Mon.	4	5.30	5.45
Tue.	5	5.40	5.35
Wed.	6	5.40	5.35
Thu.	7	5.40	5.35
Fri.	8	5.40	5.35
Sat.	9	5.40	5.35
Sun.	10	5.40	5.35
Mon.	11	5.40	5.35
Tue.	12	5.50	5.20
Wed.	13	5.50	5.20
Thu.	14	5.50	5.20
Fri.	15	5.50	5.20
Sat.	16	5.50	5.20
Sun.	17	5.50	5.20
Mon.	18	5.50	5.20
Tue.	19	6.00	5.10
Wed.	20	6.00	5.10
Thu.	21	6.00	5.10
Fri.	22	6.00	5.10
Sat.	23	6.00	5.10
Sun.	24	6.00	5.10
Mon.	25	6.00	5.10
Tue.	26	6.10	4.55
Wed.	27	6.10	4.55
Thu.	28	6.10	4.55
Fri.	29	6.10	4.55
Sat.	30	6.10	4.55
Sun.	31	6.10	4.55

TOTAL HOURS DURING 1907.

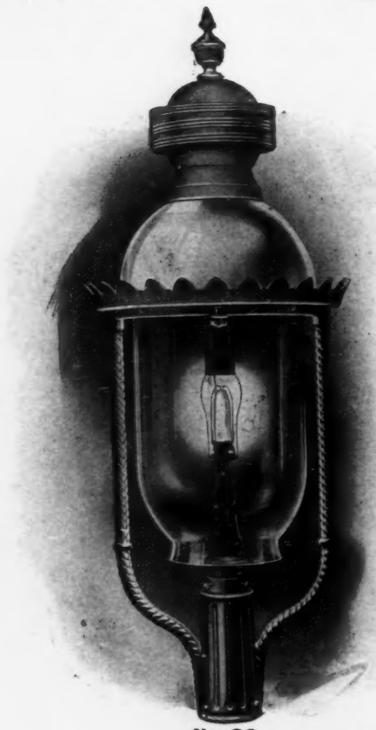
By Table No. 2.

	Hrs. Min.
January	423.20
February	355.25
March	355.35
April	298.50
May	264.50
June	234.25
July	243.45
August	280.25
September	321.15
October	374.30
November	401.40
December	433.45
Total, yr.	3987.45

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY

....OF AMERICA....



No. 36.

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Uniformly SUCCESSFUL in 150 Cities and Towns.

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Council Bluffs, Ia. (2d contract).
Seattle, Wash. (2d contract).
Philadelphia, Pa.
Waterbury, Conn.
Manchester, N. H.
Allentown, Pa.
Omaha, Neb.
Muskegon, Mich.
Nazareth, Pa. (2d contract).
Lewistown, Pa.
Greenville, Tex.
New York, Cent. Un. (3d contract).
Jefferson City, Mo.
Peekskill, N. Y. (2d contract).
Waterville, Me.
Washington, D. C. (4th contract).
Lawrence, Mass. (3d contract).
Hampton, Va.
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Milwaukee, Wis.
Syracuse, N. Y. (2d contract).
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TOTAL SETS INSTALLED IN 1906, ... 41
TOTAL SETS TO DATE, ... 634
TOTAL DAILY CAPACITY, ... 502,555,000 cu. ft.

Tar Extractors for Carburetted Water Gas.
Photometrical Apparatus.
Gas Analysis Apparatus.
Recording Gauges.
Straight Standpipe System for Coal Gas Retorts.
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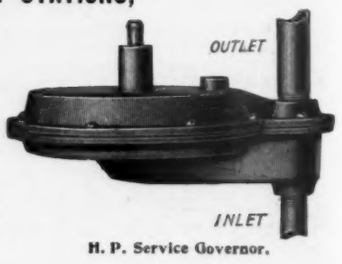

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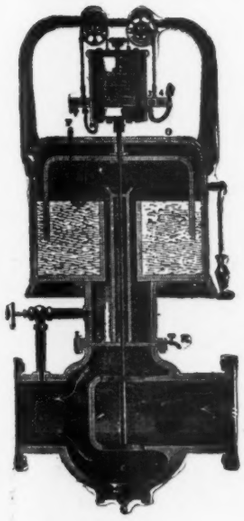

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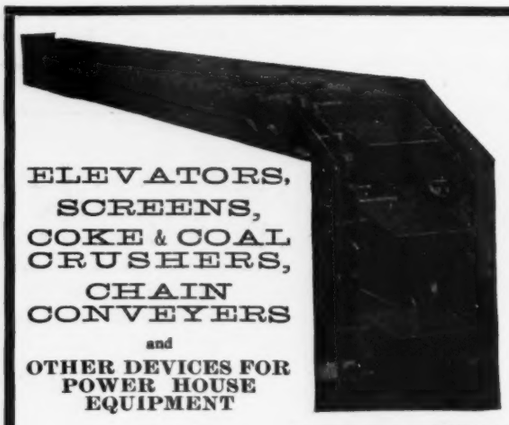

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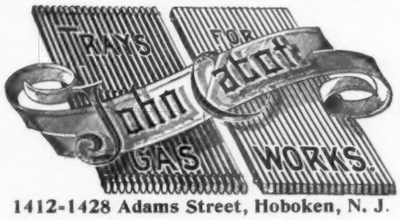

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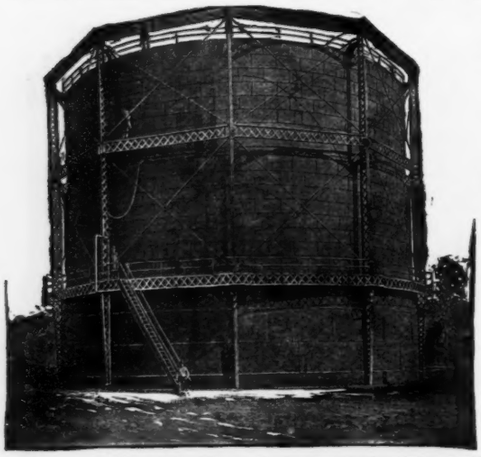

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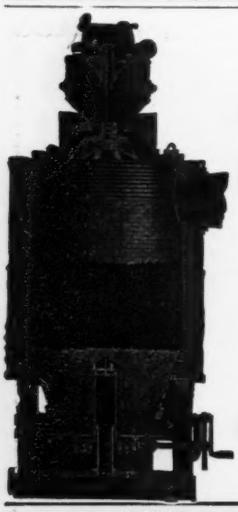

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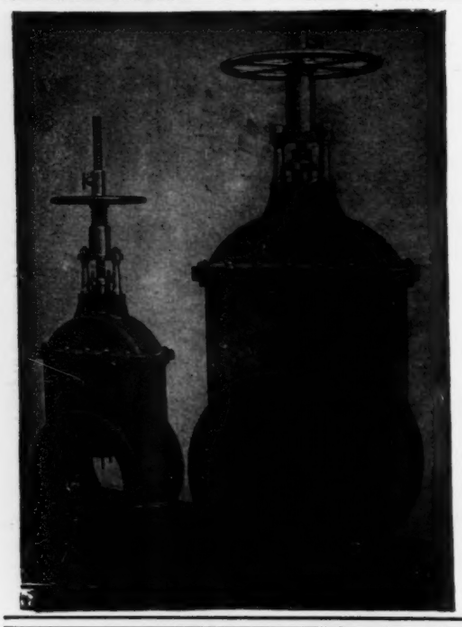

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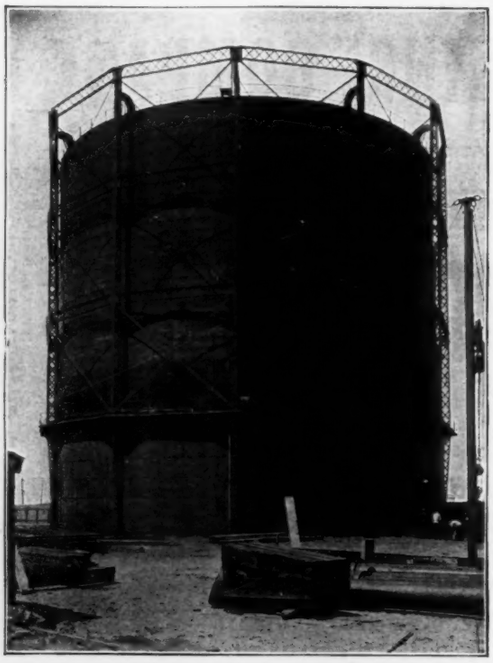

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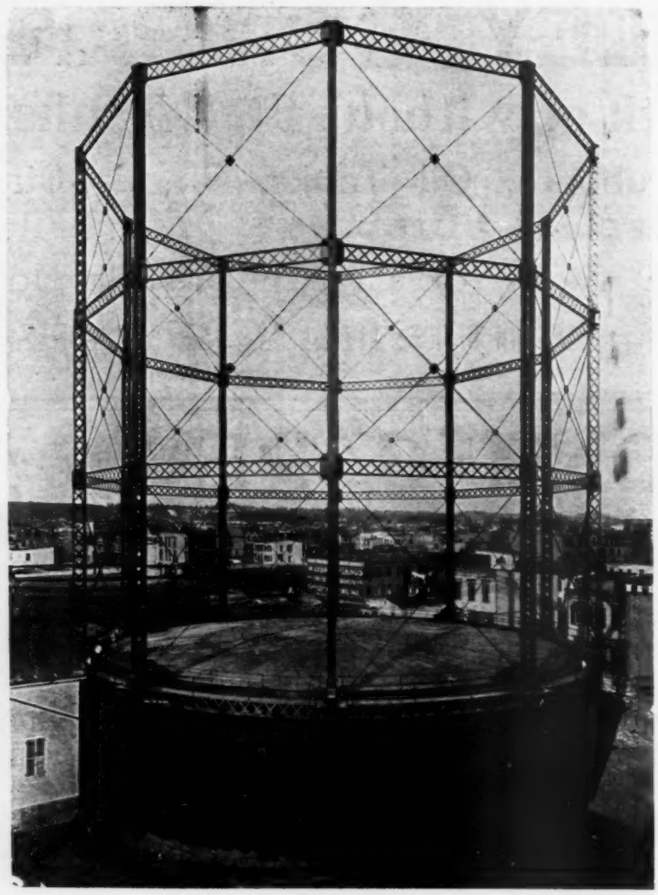

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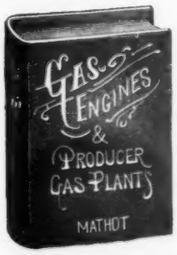

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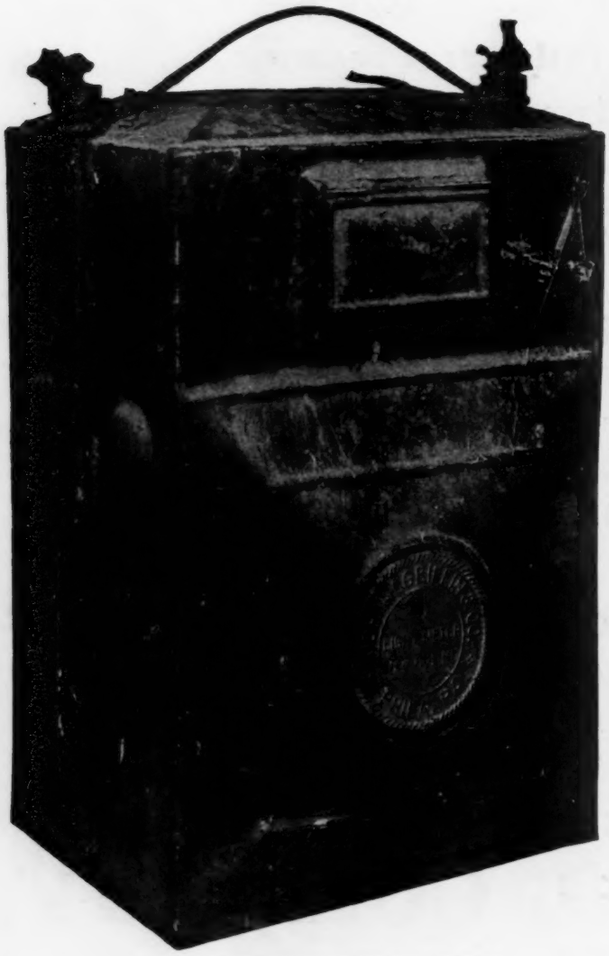
BEFORE.



This is a photograph of a 3-light regular meter out of a lot of meters received from the Coatesville Gas Co., Coatesville, Pa., to be repaired and converted into prepayment meters.

AFTER.

This is the same meter after it has been repaired and converted into a new prepayment meter.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,

559 West 47th Street, NEW YORK.

PHILADELPHIA.

Jefferson and Monroe Streets CHICAGO.

OVER 350,000 OF THE POSITIVE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES.

SEND FOR OUR BOOKLET.